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No. 4

ANNUAL REPORT OF THE OHIO ACADEMY OF SCIENCE Forty-eighth Meeting 1938

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THE OHIO ACADEMY OF SCIENCE

Organized 1891

Incorporated 1892

Affiliated with the American Association for the Advancement of Science

OFFICERS AND COMMITTEES FOR 1938-1939

President

CLAUDE E. O'NEAL

Vice-Presidents

- | | |
|------------------------------------|-------------------------------------|
| A. Zoology: R. A. HEFNER | E. Psychology: JAMES R. PATRICK |
| B. Botany: PAUL B. SEARS | F. Phys. and Astronomy: L. E. SMITH |
| C. Geology: W. S. COLE | G. Geography: FRED A. CARLSON |
| D. Medical Sciences: L. F. EDWARDS | H. Chemistry: HARVEY V. MOYER |
| I. Mathematics: (To be supplied) | |

Secretary

WILLIAM H. ALEXANDER

Treasurer

EUGENE VAN CLEEF

Executive Committee

Ex-Officio: CLAUDE E. O'NEAL, WM. H. ALEXANDER, EUGENE VAN CLEEF
Elective: CHARLES G. SHATZER, J. PAUL VISSCHER

Board of Trustees

- | | |
|---|------|
| HERBERT OSBORN, <i>Chairman</i> , term expires..... | 1941 |
| WILLIAM LLOYD EVANS, term expires..... | 1939 |
| JAMES P. PORTER, term expires..... | 1940 |

Library Committee

MRS. ETHEL M. MILLER, *Chairman*,

In charge of Academy Exchanges and Publications

- | | |
|--------------------------------------|------|
| W. H. SHIDELER, term expires..... | 1939 |
| GEORGE D. HUBBARD, term expires..... | 1940 |

Committee on Conservation

- | | |
|---|------|
| EDWARD S. THOMAS, <i>Chairman</i> , term expires..... | 1940 |
| EMERY R. HAYHURST, term expires..... | 1939 |
| EDMUND SECREST, term expires..... | 1939 |
| L. E. HICKS, term expires..... | 1939 |
| F. H. KRECKER, term expires..... | 1940 |
| W. E. STOUT, term expires..... | 1940 |
| G. W. CONREY, term expires..... | 1941 |
| E. L. WICKLIFF, term expires..... | 1941 |
| ROBERT B. GORDON, term expires..... | 1941 |

Academy Representatives on the Joint Administrative Board, Ohio Journal of Science

- | | |
|-------------------------------------|------|
| EDWARD L. RICE, term expires..... | 1939 |
| WALTER H. BUCHER, term expires..... | 1940 |

Nominating Committee for 1939

- | | |
|-------------------------|---------------------------------|
| A. WARREN P. SPENCER | E. HAROLD E. BURTT, <i>Chm.</i> |
| B. RAYMOND A. DOBBINS | F. DAYTON C. MILLER |
| C. JOHN L. RICH | G. FRANK J. WRIGHT |
| D. DR. BRUCE K. WISEMAN | H. W. CONRAD FERNELIUS |
| I. (To be supplied) | |

REPORT OF THE FORTY-EIGHTH ANNUAL MEETING OF THE OHIO ACADEMY OF SCIENCE

WILLIAM H. ALEXANDER,

Secretary

The Forty-eighth Annual Meeting of the Ohio Academy of Science was held at the College of Wooster, Wooster, Ohio, on May 6 and 7, 1938, under the presidency of Prof. Charles G. Shatzer, of Wittenberg College, Springfield, Ohio. The College of Wooster, ably assisted by the Ohio Agricultural Experiment Station, made every possible effort to anticipate and provide for the requirements, comfort and pleasure of all visiting scientists and the verdict seemed to be that the meeting was an unusually successful one from every point of view. Thanks to both institutions!

The business portion of the meeting consisted of two short sessions, both held in the Netta Strain Auditorium, Taylor Hall, of the College of Wooster, the first beginning at 9:30 A. M. on Friday, May 6, and the second on Saturday morning.

Very briefly, for economical reasons, the chief items of business transacted at the business sessions were:

- I. The announcement by the President of the appointment of the three committees, viz.:
 1. *Membership*—JOHN L. RICH, Chairman; GEORGE D. HUBBARD, D. F. MILLER.
 2. *Resolutions*—EUGENE VAN CLEEF, Chairman; WM. C. BEAVER, J. PAUL VISSCHER.
 3. *Necrology*—HERBERT OSBORN, Chairman; PAUL E. MARTIN, FRANK J. WRIGHT.
- II. Reports of Officers.
 1. Secretary.
 2. Treasurer.
 3. Librarian.
- III. Reports of Committees.
 1. The Executive, by the Secretary.
 2. Trustees of the Research Fund, by Herbert Osborn.
 3. Membership Committee, by John L. Rich.
 4. Save Outdoor Ohio, by A. E. Waller.
 5. Necrology Committee, by Dr. Herbert Osborn.
 6. Joint Administrative Board, Ohio Journal of Science, by B. S. Meyer.
 7. Resolutions Committee, by Eugene Van Cleef.

IV. Motions Passed.

1. Authorizing the formation of a Section of Mathematics.
2. To co-operate with the Director of Education.
3. As to effective date of the beginning of memberships.
4. Election of representative on the Council of the A. A. A. S., referred to the Executive Committee with power.
5. To meet with the University of Cincinnati in 1939.

V. Amendments Passed.

1. In as much as the duties of the Publications Committee as defined in Article IV of the Constitution have been merged in the duties of the Joint Administrative Board of the Ohio Journal of Science, it is recommended that the Constitution be amended by the omission of Sections 3 and 14 of Article IV. (Rec. by the Exc. Com. Adopted.)
2. *Membership Committee*.—The Membership Committee shall consist of one member from each Section of the Academy, elected by the Section or appointed by the Vice-President of the Section. (Art. IV, Sec. 3, approved as amended.)
3. *Duties of Membership Committee*.—The Membership Committee shall seek to secure new members for the Academy, pass upon the sufficiency of the applications, and make report with recommendation to the Executive Committee or to the Academy. (Art. IV, Sec. 14 approved as amended.)

VI. Resolutions Passed.

1. *Resolved*, That applications for membership approved at the spring meeting be made effective dating from the beginning of the calendar year in which they are approved.
2. *Resolved*, That the business of the Ohio Academy of Science, beginning with the fiscal year 1939-1940 and thereafter, be transacted by a Council. (Rec. by Exec. Com.)
3. *Resolved*, That a committee be appointed by the President to review the Constitution and By-Laws of the Academy and report with recommendations as to changes necessary to comply with the preceding resolution, at the annual meeting in 1939, this resolution to serve as notice to amend. (Rec. by Exec. Com.) (In accordance with said resolution the following were appointed:—F. C. Blake, G. D. Hubbard and F. H. Kreckler.)
4. *Resolved*, That a committee on counsel and co-operation in the study of the science needs of the public schools be appointed by the President in 1938-1939, to study the needs of the public school science teachers with reference to their academic preparation and to consult and co-operate with the State Director of Education with a view to offering him any support and assistance at their command. (In accordance with said resolution the following were appointed:—C. G. Shatzer, H. C. Sampson, A. W. Lindsey, L. W. Taylor and W. A. Manuel.)

5. "The Western Society of Naturalists, meeting in Berkeley, California, December 28, 29 and 30, 1937, records its emphatic opposition to any measure such as the proposed 'State Humane Pound Law' which will hinder or curtail animal experimentation as conducted by those fully qualified in biology and medicine. It is the belief of this Society that the present level of health and humane protection of man and animals and further advance in our knowledge of the phenomena of life can be maintained only by constant vigilance and by continued study of the nature of vital processes through the experimental investigation of living animals. Every effort should be made to provide the necessary animals for scientific studies rather than to interfere by the passage of hampering legislation." (Unanimous approval was given this resolution at the request of the California Society for the Promotion of Medical Research.)

See the reports of the Conservation Committee and the Representative on the Save Outdoor Ohio Council for other resolutions.

There was only one general scientific session of the Academy and that was on Friday morning following the first business meeting. At this general session the Academy had the pleasure of hearing an address on "Heredity and Education," by Dr. Paul Popenoe, the distinguished director of the Institute of Family Relations, Los Angeles, Calif.; also one by State Director of Education E. N. Dietrich, of Columbus, Ohio, on "The Training of Science Teachers."

The annual dinner was not only a festive occasion but a real intellectual treat. The outstanding feature, of course, was the Presidential Address by President Charles G. Shatzer, on "When Are We Scientific." He gave the scientist much food for sober thought. Following the presidential address, Dr. George B. Barbour, of the University of Cincinnati, showed a color film of "Vesuvius in Eruption." In addition to these addresses, there was the usual exchange of courtesies, President Charles F. Wishart, of the College of Wooster, and Director Edmund Secrest, of the Ohio Agricultural Experiment Station, extending gracious words of cordial welcome and good wishes, to which Dr. Dayton C. Miller, of Case School of Applied Science, Cleveland, made a happy response appropriately interpreting the feelings of every member of the Academy present on that delightful occasion.

And so by common consent the forty-eighth annual meeting was one of the most successful the Academy has ever held and very likely all who attended are already dreaming of a return visit!

A very complete, detailed (stenographic) report of this meeting is on file in the office of the Secretary.

Report of the Secretary

WOOSTER, OHIO, May 6, 1938.

To the Ohio Academy of Science:

As in former years, the office of the Secretary has endeavored most diligently to look after the interests of the Academy with efficiency and despatch. We wish once again to record our high appreciation of the fine spirit of co-operation displayed at all times both by officers and members. We have co-operated in every possible way with the Treasurer in his fine efforts to secure new members for the Academy and while we had hoped to report one hundred or more, we are glad to report a half-a-hundred or more. The roll of members has been thoroughly purged and we now have something like 500 active members. With the approach of our semi-centennial year, the campaign for new members should go on with increased vigor. A goal of 1,000 members by 1940 is not at all unreasonable and should be our minimum. In a State with some 60 colleges and universities to draw upon, the Ohio Academy might easily become the largest in the country.

The Secretary attended all the sessions of the Council of the A. A. A. S. at Indianapolis, Ind., last December, and all the meetings of the Academy Conference. Our chief service to the Academy at this meeting of the A. A. A. S. was, perhaps, in clearing the way for a slightly increased allowance for research, we hope, when these funds are distributed.

One item of interest to report is the securing of some of the original minute books, papers and pamphlets, etc., found among the effects of the late Prof. L. B. Walton, through the courtesy of Mrs. Walton. These will be useful to the Committee on Historical Statistics and Lists, in connection with the Semi-Centennial. It may not be out of place to observe at this point that if we are to make this observance all it might be and we hope it will be, every member must put his or her shoulder to the wheel and give those who undertake to lead us a united, hearty support from the very start.

Respectfully submitted,

WM. H. ALEXANDER,
Secretary.

*Report of the Treasurer**To the Ohio Academy of Science:*

Statement of Income and Expense for the year ended December 31, 1937.

INCOME:

Membership Dues.....	\$ 965.00
Grants for Research from A. A. A. S.....	275.00
Interest on Bonds.....	78.00
Sale of Publications.....	24.18
Dinner Receipts.....	245.00

Total Income.....\$1,587.18

EXPENDITURES:

Faculty Club Dinner Expense.....	\$274.69
Speakers.....	50.00
Clerical Assistance.....	51.00
Postage and Telegraph.....	37.85
Office Supplies.....	5.90
Expenses of Officers to Meetings.....	87.06
Printing:	
Proceedings, Ohio Journal of Science.....	130.40
Other.....	140.34
Subscriptions, Ohio Journal of Science.....	501.00
Membership, Save Outdoor Ohio Council.....	8.00
Research Grants.....	175.00
Secretary's Honorarium.....	100.00
Safety Deposit Box.....	3.30
Auditing Expense.....	3.00
Reporter for 1937 Meeting.....	7.00
Bank Charges.....	6.09

Total Expenditures.....1,580.63

Net Increase in Net Worth for the Year.....\$ 6.55

BALANCE SHEET

As at December 31, 1937

ASSETS

Current Expense Fund:

Cash in Bank.....	\$ 191.96
Bonds—Consolidated Federal Farm Loan 3%, 1945-55.....	1,300.00

Total Current Expense Fund.....\$1,491.96

Research Fund:*

Cash on Deposit.....	\$ 247.27
Banc Ohio Securities Company Stock (at cost).....	437.50
Bonds—Fort Hayes Hotel, Columbus (at cost).....	1,300.00

Total Research Fund.....1,984.77

Total Assets.....\$3,476.73

LIABILITIES AND NET WORTH

Liabilities.....	None
Net Worth—Ohio Academy of Science.....	\$3,476.73

Total Liabilities and Net Worth.....\$3,476.73

*These funds are not in the custody of the Treasurer.

Respectfully submitted,

EUGENE VAN CLEEF,
Treasurer.

Report of the Auditor

To the Ohio Academy of Science:

I have examined the accounts and records of the Ohio Academy of Science for the periods January 1-May 28, 1937; May 28-December 31, 1937, and I hereby certify that in my opinion the accompanying statements of cash receipts and disbursements, and the attached Balance Sheet presents the financial condition as at December 31, 1937.

Respectfully submitted,

D. M. SHONTING,
Public Accountant.

Report of the Board of Trustees, Research Fund

To the Ohio Academy of Science:

During the past fiscal year there have been additions to the Fund of \$71.00 from interest and dividends, so that the amount subject to check was \$247.27 on December 31, 1937. A statement for the fiscal year, ending December 31, 1937, is as follows:

RECEIPTS	
Balance on hand December 31, 1937.....	\$ 177.02
Received from Interest and Dividends.....	71.00
Total.....	\$ 248.02
DISBURSEMENTS	
Service Charge, Ohio National Bank.....	\$.75
Balance on hand, Checking Account.....	247.27
Total.....	\$ 248.02
No changes have been made in investments.	
Bonds at Face.....	\$1,300.00
Stock, Ohio National Bank, at Cost.....	437.50
Total Invested.....	\$1,737.50
Balance on Deposit, Checking Account.....	247.27
Total Assets.....	\$1,984.77

Receipts since December 31, 1937, are \$36.50, less service charge leaves us a checking account of \$283.52. No grants have been charged to this account the past year.

By action of the Executive Committee the Board was authorized to assign the allowance coming from the A. A. A. S. and the following grants were allotted, the items being carried in the Treasurer's account:

To Dr. D. C. Rife, Ohio State University, for genetic studies of monozygotic twins and other multiple births, \$75.00.

To Mr. Wayne M. Felts, Cincinnati University, for research on an acid intrusive in the Cascade Mountains of Southwestern Washington, \$100.00.

To Dr. R. A. Dobbins, Ohio Northern University, for Vegetation of the northern 'Virginia Military Lands' of Ohio, \$100.00.

These requests were accompanied by ample endorsements by Academy members and the allotments have been reported to the Permanent Secretary of the A. A. A. S. for his information and record.

As we may expect another allowance from the American Association which it is desirable to allot without delay and as we have a balance from which some grants may be made we will be pleased to receive applications and to act upon them without delay.

Respectfully submitted,

HERBERT OSBORN, *Chairman*,
WM. LLOYD EVANS,
Trustees.

Report of the Executive Committee

By the Secretary

WOOSTER, OHIO, May 6, 1938.

To the Ohio Academy of Science:

Your committee has held two well-attended meetings for the transaction of Academy business during the year: one on December 18, 1937, in the office of the Treasurer, and the other last evening at the Ohio Hotel, Wooster, Ohio.

At the first meeting, the chief items of business transacted were: (1) The approval of five applications for membership in the Academy; (2) the approval of the payment of \$175.00 from the Research Fund for approved projects; (3) the authorization of the purchase of books for the use of the Treasurer, not to exceed \$25.00 in cost; (4) the approval of a membership campaign as outlined by the Treasurer; (5) approval of the purchase of certain lands known as "Fort Hill" and "Cedar Swamp" for State park purposes, the Secretary being instructed to so advise the Governor and certain other members of the General Assembly; (6) elected the Secretary to represent the Academy on the Council of the American Association for the Advancement of Science and at the Conference of State Academies; (7) the fixing of the date of the next annual meeting of the Academy for May 6 and 7, 1938; (8) an allowance of \$15.00, or as much thereof as necessary, was voted for each Vice-President and the same amount for a stenographer at the annual meeting; (9) the election of the following persons in accordance with Item No. 10 of the preliminary report on the semi-centennial as chairmen of Group A Committees:

- (1) *Publicity*—EDWARD S. THOMAS, Ohio State University.
- (2) *Program*—CLARENCE H. KENNEDY, Ohio State University.
- (3) *Speakers*—FRANK J. WRIGHT, Denison University.
- (4) *Invitations*—(To be supplied later).
- (5) *Historical Statistics and Lists*—SAMUEL RENSHAW, Ohio State University.

At the second meeting, it was voted: (1) to approve and recommend the election of 52 new applications; (2) to recommend the approval of certain amendments to the Constitution and By-Laws; (3) to recom-

mend that the Academy go on record as favoring the council form of government in the transaction of its business and that a committee be appointed to suggest the necessary changes in the Constitution at the next annual meeting; (4) to approve the petition of 17 members for the formation of a Section of Mathematics; (5) to recommend that an extension of time be given the Nominating Committee for the selection of a Director for the semi-centennial; (6) to recommend that the Academy accept the invitation of the University of Cincinnati to hold the 1939 annual meeting at that institution.

Report of the Committee on the Election of Fellows

WOOSTER, OHIO, May 6, 1938.

To the Ohio Academy of Science:

The Committee on the Election of Fellows in the Ohio Academy of Science, consisting, as you know, of the officers of the Academy and the Vice-Presidents of the Sections, met this morning at the College of Wooster and elevated the following members to the rank of Fellows in the Ohio Academy of Science, viz.:

DR. FRED A. CARLSON.....	Ohio State University
DR. RAYMOND ANSON DOBBINS.....	Ohio Northern University
DR. ROBERT ARTHUR HEFNER.....	Miami University
DR. WALTER C. McNELLY.....	Miami University
DR. JOHN J. WOLFORD.....	Miami University

Respectfully submitted,

WM. H. ALEXANDER,
Secretary.

*Report of the Joint Administrative Board
of the Ohio Journal of Science*

COLUMBUS, OHIO, May 4, 1938.

To the Ohio Academy of Science:

The meeting of the Joint Administrative Board was held at Ohio Wesleyan University, Delaware, Ohio, on April 16, 1938. Present were all members of the Board, the Editor and the Business Manager. The meeting was called to order by Chairman Rice at about 1:00 P. M. The minutes of the preceding meeting were read and approved.

Upon motion, the terms of all present officers were continued for the year 1938. Both the Editor and the Business Manager informed the Board that they did not care to have their terms of office prolonged beyond ten years, and it was suggested that it would be desirable for the Board to begin to look for persons qualified to fill these offices.

The Business Manager presented his financial report as follows:

RECEIPTS

Balance from 1936.....	\$ 247.92
University Allowance.....	750.00
Ohio Academy of Science, Dues.....	598.50
Ohio Academy of Science, Publication of Proceedings.....	191.59
Sigma Xi, Special Grant.....	299.27

Subscriptions.....	83.50
Author's Payments for Plates.....	161.68
Sale of Back Numbers.....	6.50

\$2,338.96

EXPENDITURES

Spahr & Glenn Co., Printing Vol. 36, No. 5.....	\$ 249.50
Spahr & Glenn Co., Printing Vol. 37, Nos. 1-5.....	1,195.62
Spahr & Glenn Co., Envelopes.....	62.50
Postmaster.....	141.80
Bucher Engraving Co.....	249.09
Clerical Assistance.....	3.25

\$1,901.76

Balance on hand Feb. 26, 1938 (Huntington National Bank).....	437.20
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\$2,338.96

As of this date bill for November, 1937 number of the Journal, amounting to \$497.17, is unpaid. All other 1937 bills are paid.

Upon motion this report was accepted and placed on file. Dr. Transeau was appointed a committee of one to audit the Business Manager's report.

The meeting adjourned about 3:00 P. M.

Respectfully submitted,

B. S. MEYER,
Secretary.

Report of the Library Committee

COLUMBUS, OHIO, April 27, 1938.

To the Ohio Academy of Science:

The members of the Library Committee were much saddened at the loss of one of its members, Dr. L. B. Walton, who died the day after he had been re-appointed to the committee for another three-year term. A biographical sketch of him will be given by the Necrology Committee.

The work of the chairman of this library committee has been of the customary routine nature, such as taking care of the correspondence, of the sales of publications and the mailing list, claiming issues of periodicals that somehow had failed to arrive and posting out issues of our journal when requested. In addition the stock of last year's Ohio Journal of Science was assembled into volumes, wrapped and stored in the Ohio State University Library. Just before the first number of the 1938 volume of the Journal was issued the mailing list was checked with that of the Treasurer of the Academy and also with the official list in the mailing room.

Five new exchanges were secured during the year and fourteen were dropped. The total number of exchanges is now 362, of which 95 are in this country and 267 in foreign countries.

The sales of publications amounted to only \$22.39. Eighteen sales were made and thirty-four Special Papers were sold, but none of the Annual Reports. Five of these eighteen sales were made to

book dealers who purchased fourteen items or nearly half of all that were sold and who furnished one-third of the entire sales amount. A change in policy accounted for this increase in sales to dealers. In former years they received no discount, hence there was no incentive to purchase any papers. However, as the stock of all of the Reports and of most of the Special Papers is large and as only two have been published later than 1912, it was decided by the library committee to allow a ten per cent discount to dealers and thus to increase the sales if possible. If this had not been done the sales for 1937 would have consisted of only twenty items at the very small total of \$14.70. The sum of \$22.39 plus 29 cents sales tax has been given to the Treasurer of the Academy.

At the end of 1937 the sum on deposit in the building and loan company amounted to \$32.25. This amount plus \$4.75 which had previously been paid to the Treasurer, or \$37.00, represented the total dividends earned by the various sums which had been deposited in the five and a half years from June, 1926, to January, 1932. On January 18, 1938, this account was closed and the entire amount was given to the Treasurer of the Academy.

In accordance with the policy of the last few years, no formal financial statement is given in this report, but it has been duly made and is on file for the purpose of record in the office of the Treasurer and also in the library of the chairman of this committee.

The privilege of borrowing books from the Ohio State University Library is called again to the attention of the members of the Academy, for it has been five years since this was done, and many new members have joined during this time. Some of the other members also do not seem to realize that they are entitled to draw out books as individuals if they live at a distance from a college or university. For those who are associated with an institution it is preferred that they borrow books through their own library on the inter-library loan plan. There is much material in the library of the Ohio State University that surely could be of value to the members of the Ohio Academy of Science if they would make use of it.

Respectfully submitted,

ETHEL MELSHEIMER MILLER,
Chairman.

Report of the Membership Committee

WOOSTER, OHIO, May 7, 1938.

To the Ohio Academy of Science:

Applications for membership in the Academy properly countersigned and accompanied by one year's dues were received by your committee from the following persons whose election to membership we cordially recommend, viz.:

AMSTUTZ, MARY E., (A), 410 Pleasant St., Ashland.

ARENSON, S. B., (H), University of Cincinnati, Cincinnati.

BARNES, HUGHES, (A and B), 202 N. Urich St., Urichsville.

- BERNHAGEN, RALPH J., (C), O. S. U., Columbus.
 BLACKBURN, N. D., (A), O. S. U., Columbus.
 BOSSERT, ROY G., (H), O. W. U., Delaware.
 BRAND, PAUL J., (G), 1683 Biddle St., Ravenna.
 BUSCH, KARL HENRY, (A), 2424 Sherwood Rd., Bexley.
 BUSCH, HARVEY L., (A), 1596 Parkwood Rd., Lakewood.
 CAMPBELL, F. L., (A, D and H), 1952 Concord Rd., Columbus.
 CATALINE, ELMON L., (D and H), University of Toledo, Toledo.
 CHITTAM, JOHN W., (H), College of Wooster, Wooster.
 CRIST, EMMITT L., (B), I. O. O. F. Bldg., Circleville.
 CROWL, GORDON S., (B), O. S. U., Botany Dept., Columbus.
 DEMARINIS, FRANK, (A), 2170 Stillman Rd., Cleveland Heights.
 DEXTER, RALPH W., (A and B), Kent State University, Kent.
 DUNGAN, THEODORE C., (E and F), 83 Sixteenth Ave., Columbus.
 ELSASS, DONALD H., (A and H), 670 Vernon Rd., Bexley.
 ERF, HERBERT A., (F), 16827 Fernway Rd., Shaker Heights.
 GRADY, ROY I., (H), College of Wooster, Wooster.
 FROMM, GUY, (F), Capital University, Columbus.
 HAMILTON, DR. FRANK E., (D), Kinsman Hall, O. S. U., Columbus.
 HERRICK, J. ARTHUR, (A and B), Kent State University, Kent.
 HESKETT, CLARENCE, (G), O. S. U., Columbus.
 HOKE, ROY DAVIS, (C and F), 1750 S. Union Ave., Alliance.
 HOUSLEY, C. R., (A and B), R. F. D. No. 1, Pemberville.
 HOWLETT, FREEMAN S., (B), 357 Blessing Ave., Wooster.
 JONES, CLYDE H., (B), 34 W. Norwich Ave., Columbus.
 KARNES, LOWRY B., (G and C), 488 W. Seventh Ave., Columbus.
 KNOX, GEORGE, (E and F), O. S. U., Columbus.
 LACKEY, JAMES B., (A), Third and Kilgour Sts., Cincinnati.
 LAMBERT, RAY, (F), 3422 Woodburn Ave., Cincinnati.
 LAPHAM, MARJORIE J., (A), 40 E. South St., Painesville.
 LEDGERWOOD, RICHARD, (E, D and A), 1864 Summit St., Columbus.
 MACHLE, DR. WILLARD, (D), College of Medicine, Cincinnati.
 MAHARRY, JOHN P., (G, C and F), 413 W. Warren St., Youngstown.
 MASON, HELEN MANDILLA, (B), R. F. D. No. 4, Newark.
 MAYFIELD, SAMUEL M., (C and G), Bowling Green State Univ., Bowling Green.
 MILLER, EUGENE J., (C and G), Loudonville Times, Loudonville.
 MOKE, CHARLES B., (C), College of Wooster, Wooster.
 MYERS, R. MAURICE, (B), O. S. U., Dept. of Botany, Columbus.
 NOLAN, ALFRED FRANCIS, (D), 40 Brevort Rd., Columbus.
 PALINCHAK, STEVE, (H, F and I), 2546 Auburn Ave., Cincinnati.
 PORTER, WALTER P., (B and A), 135 Grosvenor St., Athens.
 POWELL, G. W. H., (H, F, A and I), Urbana Junior College, Urbana.
 RAY, FRANCIS E., (H), University of Cincinnati, Cincinnati.
 RICHARDS, C. F., (E), Denison University, Granville.
 RIEVESCHL, GEORGE, JR., (H, F and I), 112 Mill St., Lockland.
 RIFE, D. C., (B and A), 1483 N. Star Rd., Columbus.
 ROSZMAN, FOSTER D., (A), Bowling Green Univ., Bowling Green.
 SALETTEL, DR. LOUIS, (C), University of Dayton, Dayton.
 SCHWARZBEK, WM., (E), Wittenberg College, Springfield.
 SCOFIELD, EDWARD H., (E), Columbus.
 SEAMAN, ELWOOD A., (A and B), 1368 Beall Ave., Wooster.
 SHILLING, E. R., JR., (B and A), Kent State University, Kent.
 SOLBERG, ARCHIE N., (D), University of Toledo, Toledo.
 SOUTHWICK, ERMAN DEAN, (C), Mt. Union College, Alliance.
 STEIDTMANN, WALDO E., (B), Bowling Green State Univ., Bowling Green.
 THOMPSON, ISABEL, (B), 3317 Jefferson Ave., Apt. 21, Cincinnati.
 WALLACE, ATWELL M., (B, H and C), 232 W. Lane Ave., Columbus.
 YOCUM, DR. LINCOLN A., (D), Wooster.

Respectfully submitted,

JOHN L. RICH, *Chm.*
 GEORGE D. HUBBARD
 D. F. MILLER

*Report of Dr. A. E. Waller, Academy Representative on the
"Save Outdoor Ohio" Council*

WOOSTER, OHIO, May 7, 1938.

To the Ohio Academy of Science:

For the first time in Ohio's history, we are presented with the possibility of developing the Lake Erie shore to make it available for the use of the people of Ohio.

The Ohio legislature, in special session February 28, 1938, adopted a resolution memorializing the Conservation Council to purchase lands as sites for the establishment of state parks along the shores of Lake Erie for conservation and recreation purposes. The resolution provided for the appointment of a committee, with expenses to be paid from legislature committee funds, to make a study of suitable areas on the shore of Lake Erie, and report back to the legislature at any special session.

Governor Martin L. Davey, in a radio address March 24, stated: "It is surprising that Ohio is the only state bordering on the Great Lakes that does not provide park facilities for its people. In fact, our public parks are pitifully inadequate, and if we are to do a really good job, this state must start soon to revise its policy and program with reference to public parks. . . . This, I believe, should be the next great forward step."

The sentiment expressed in the legislature's resolution and in Governor Davey's radio address is well founded. The state of Ohio does not own a single square foot of land on the shore of Lake Erie which can be used for conservation or recreational purposes. Other adjoining states have developed elaborate park systems for the citizens of their states, and in most cases these states have less natural advantages than Ohio.

The Save Outdoor Ohio Council, supported by a number of state-wide organizations interested in the conservation of our natural resources and restoring our wild life, is sponsoring a land-acquisition program for the purpose of establishing and developing a series of state parks along the shores of Lake Erie.

Approval by the Academy of the following resolution is heartily recommended, viz.:

WHEREAS, There are no state park facilities on the shores of Lake Erie for wildlife conservation and recreational purposes; and

WHEREAS, The establishment of state parks on the shores of Lake Erie would provide conservation and recreational facilities for the people of our state;

Therefore, be it Resolved, by the Ohio Academy of Science, that the Conservation Council of Ohio is urged to develop a Lake Erie State Park Program, and that the members of the Legislature of Ohio be requested to pass necessary legislation appropriating funds to purchase lands as sites for the establishment of State Parks along the shores of Lake Erie for conservation and recreational purposes.

Be it further Resolved, That any such parks developed on the shores of Lake Erie shall be known temporarily as Lake Erie State Park No. 1, Lake Erie State Park No. 2, Lake Erie State Park No. 3, etc., in order that they may be widely presented and promoted as conservation and recreational areas for the use of the people of Ohio. (Approved)

Report of the Committee on Necrology

To the Ohio Academy of Science:

It becomes the sad duty of your committee to record the death during the past year of five of the prominent members of the Academy. With the material available it has been difficult to give adequate tributes to their service in the Academy or the measure of their contribution to science.

Only a few days after the close of our last year's meeting we were shocked by news of the sudden death of Dr. Walton, of Kenyon College.

LEE BARKER WALTON

Lee Barker Walton, born at Bear Lake, Pennsylvania, November 12, 1871, died at Gambier May 12, 1937. His connection with the Ohio Academy dated from his first year of service as Professor of Biology at Kenyon College, 1902, and he has been one of our most loyal and useful members in the succeeding years. He served as secretary from 1905 to 1912 and as president in 1913. He has also been a valued member of a number of important committees and was one of the Trustees of the Research Fund for several years, 1930 to 1936.

Dr. Walton was a man of varied interests and aside from his important contributions in biology was influential in the promotion of athletics and was fond of games and social contacts. He was an exceptional teacher and inspired many young men to go forward in biological studies especially in medicine. He spent the summers of 1905-'06-'07 and '09 at the Lake Laboratory and was a contributor to the Ohio Biological Survey. His valuable articles on "Euglenoidea of Ohio" and "Studies of Organisms in Water Supplies" are in demand from many quarters outside of Ohio. His genial companionship and stimulating personality will be greatly missed by a large circle of friends.

JOSEPH A. CULLER

Dr. Joseph A. Culler, who died May 18, 1937, was for many years a professor at Miami University and Dr. S. R. Williams, a long time associate and friend, has furnished the following tribute:

"Dr. Joseph A. Culler was born in Wayne County, Ohio, March 5, 1858, and died at the Miami University hospital in Oxford May 18, 1937, in his eightieth year. He received the A.B. in 1884 and the Ph.D. in 1900, both degrees from Wooster College. His wife, Isabella Carnes, who survives him, also attended Wooster.

"Dr. Culler was principal of the high school in Cambridge, Ohio, the year 1884-85 and of the high school in Kenton from 1889 to 1900 and in Bowling Green from 1900 to 1903.

"In 1903 he was called to the chair of Physics in Miami University and retired from active service in 1926 because of the serious results of X-ray burns received during experimental work. Dr. Culler was quiet and reserved so that one had to become acquainted with him to appreciate his many-sided abilities. During his undergraduate course he directed the early gymnasium classes at Wooster and through his secondary school teaching, in addition to his special work in physics, he found the time to write a graded series of texts in physiology with many original illustrations.

"In college he prepared his own text book and set of laboratory directions for the introductory physics course and many of the advanced texts. His style was terse, simple and easily comprehended. His demonstrations of physical phenomena were carefully planned and with details thoroughly worked out so that the interest of the hearers never waned. He was an inspiring and painstaking teacher, experienced in the difficulties and discouragements of the young. His time and assistance were freely available for any one in need whether student, faculty or townsman.

"He was for many years on the Board of Public Affairs of the village of Oxford. He was a member of the Beta Theta Pi college fraternity and of the Masonic order. A life-long member of the Presbyterian church, he taught a men's class in the Sunday School and as long as he was physically able. His younger colleagues, especially those working in the same building, regularly relied on his manipulative ability to straighten out refractory apparatus and much more on his judgment and friendly advice to straighten out unfortunate kinks in their lives."

JOHN M. CONDRIN

In the death of John M. Condrin, of Toledo University, the Academy has lost one of its very promising young members. He joined the Academy in 1927 and his activities in research gave promise of valuable contributions in his chosen field. The following obituary notice in *Science* by his associate and friend seems especially appropriate in this connection:

"John M. Condrin, associate professor in the department of biology of the University of Toledo, died on June 9 [1937] at the age of thirty-two years. Professor H. H. M. Bowman, in whose department he was an associate, writes: 'He had been a member of the department since 1927. He was a graduate of Western Reserve University and received the M.A. degree from that institution in 1927 and was just completing work for his doctorate at the University of Michigan. He was a member of several national zoological societies and of both the Ohio and Michigan Academies of Science. He was the author of several publications on nudibranchs, genetics of pigments in mollusks and the physiology of hibernation in mammals. We will sorely miss his pleasant, active presence and scientific co-operative spirit.'"

RODNEY D. BOOK

Dr. Rodney D. Book, Corning, Ohio, who was a member of the Academy from 1933, died November 6, 1937. From notices published

at the time we glean the following items which bear upon his connection with the Academy:

Dr. Book was an ardent student of bird life and lectured extensively on this subject, and his death from pneumonia was said to have followed attendance of the National Audubon Society convention in New York City two weeks before his death. He is credited with several books on music and with musical compositions, these activities and his bird studies being secondary to his practice as a physician. He was a graduate of the Kentucky School of Medicine, the New Church Theological School of Cambridge, Mass., and the Cincinnati College of Music. His medical practice began at Corning in 1892 and continued until his death.

RICHARD E. WOLFE

Dr. Raymond Osburn has from his personal friendship with Mr. Wolfe supplied the following:

Mr. Richard E. Wolfe, of Clyde, Ohio, died suddenly during the December holidays of 1936-37. He became a member of the Academy in 1929 and continued until his untimely death. His college work was done at the Ohio State University, where he was granted the degree of B.E. in 1926. The summers of 1929-30-31 were spent at the Franz Theodore Stone Laboratory at Put-in-Bay, where he completed the work for the M.Sc. degree in zoology in 1931. His Master's thesis was the result of a very careful study of the ecology of the Miller Blue Hole (now State property) some six miles west of the better known Castalia Blue Hole. In this work his knowledge of chemistry as well as aquatic biology was a distinct asset. For ten years Mr. Wolfe had taught chemistry and biology in the high school of his home town and was held in high esteem, not only for the high grade of his work as a teacher, but also for his sterling character and genial personality.

Respectfully submitted,

HERBERT OSBORN,
FRANK J. WRIGHT,
Committee.

Report of the Nominating Committee

For President.....CLAUDE E. O'NEAL

For Vice-Presidents—

A. Zoology.....ROBERT A. HEFNER

B. Botany.....PAUL B. SEARS

C. Geology.....W. STORRS COLE

D. Medical Sciences.....L. F. EDWARDS

E. Psychology.....JAMES R. PATRICK

F. Physics and Astronomy.....LEON E. SMITH

G. Geography.....FRED A. CARLSON

H. Chemistry.....HARVEY V. MOYER

For Secretary.....WILLIAM H. ALEXANDER

For Treasurer.....EUGENE VAN CLEEF

For Executive Committee.....{CHARLES G. SHATZER
J. PAUL VISSCHER

<i>For Trustee, Research Fund</i>	HERBERT OSBORN
<i>For Administrative Board, O. J. S.</i>	WALTER H. BUCHER
<i>For Library Committee</i>	GEORGE D. HUBBARD
	{ G. W. CONREY
<i>For Committee on Conservation</i>	{ E. L. WICKLIFF
	{ ROBERT B. GORDON
<i>For Representative on Save Outdoor Ohio Council</i>	A. E. WALLER

As to the Director for the Semi-Centennial, your committee can only report "progress." We have made a very careful canvass of the entire membership list and by a process of elimination have reduced it to some seven or eight names of persons whom we believe to be entirely eligible for the position. We therefore ask the privilege of passing this list on to the new Nominating Committee and in view of the many rather elusive considerations involved recommend that this committee be given more time with power.

Respectfully submitted,

A. W. LINDSEY,
Chairman.

A motion prevailed that the nomination of a Director be referred to the new Nominating Committee with power and instructions "to make the appointment within six months if possible."

Report of the Committee on Resolutions

WOOSTER, OHIO, May 7, 1938.

To the Ohio Academy of Science:

The Committee on Resolutions submits the following conclusions for your approval, viz.:

Resolved, That the members of the Academy express their appreciation to President Wishart and staff of the College of Wooster, and to Director Secrest and staff of the Ohio Agricultural Experiment Station, for making available such excellent facilities for the meeting; and

Be it further Resolved, That the Academy indicate its indebtedness to the local committees under the efficient leadership of Dr. Karl Ver Steeg, chairman, for their untiring efforts in arranging details for the effective conduct of the general and special sessions, and for the satisfactory housing of the out-of-town guests; and

Be it further Resolved, That the members of the Academy, especially the men, extend a vote of thanks to the local committee, and to Mr. and Mrs. Edmund Secrest in particular, for providing delightful entertainment for the ladies; and finally,

Be it further Resolved, That the Academy express its pleasure in the interest shown by the public press of Wooster and other centers as evidenced by the publicity given the proceedings of the meeting.

Respectfully submitted,

EUGENE VAN CLEEF, *Chairman*,
WILLIAM C. BEAVER,
J. PAUL VISSCHER.

Report of the Committee on Conservation

WOOSTER, OHIO, May 6, 1938.

To the Ohio Academy of Science:

Your Committee on Conservation begs to submit the following report of conservation activities in Ohio during the past year.

Soil Conservation—The land resources of Ohio are used chiefly for crops, grass and forests. The purpose for which each area can best be used can be determined only by a study of the conditions existing in different parts of the State. The adoption of a program of soil conservation based on these studies can be brought about by a systematic educational program.

Our present system of crop production leads to soil deterioration. This trend has been expressed by means of a mathematical formula which properly evaluates all forces having to do with soil improvement and soil deterioration—this includes credits for the use of fertilizer and manure, and debits for uncontrolled erosion. Where, at present, the productivity balance is negative (indicating soil deterioration) it is possible, by means of a change in cropping system, to secure a favorable balance resulting in conservation of the soil.¹

As a part of the educational program of the Extension Service of the Ohio State University, county agricultural planning committees composed of representative farmers have been organized in each county of the State. These committees have studied the local situation and determined what changes in cropping systems would be desirable from the standpoint of soil conservation. Following the reports of these committees a program of soil conservation has been discussed with the groups of farmers in each county, and recommendations for changes in cropping systems have been made. In order to show the effects of these practices, a number of farms have been selected, so far in 32 counties, on which the recommendations are being carried out. In some cases this program is in co-operation with the Soil Conservation Service.

The Soil Conservation Service has four demonstration areas in which erosion control measures are being practised in co-operation with farmers. Under the direction of this Service, 11 CCC Camps are carrying out a program of soil conservation for the control of erosion on individual farms outside of the demonstration areas.

The research program for soil conservation includes the work of the Ohio Agricultural Experiment Station and the Soil Conservation Service. The Ohio Agricultural Experiment Station is engaged in making detailed soil surveys by counties, in order to secure information in regard to soil conditions in all parts of the State. Investigations of the effect of crop rotations and the use of fertilizer, manure and lime are being carried out on the main Station farm at Wooster, and in 13 outlying farms.

¹See "Our Heritage the Soil" by R. M. Salter, Ohio Agricultural Experiment Station.

The Soil and Water Conservation Experiment Station at Zanesville, operated by the Soil Conservation Service, is investigating the rate of soil loss under various cropping systems and the effect of different soil conservation measures such as strip cropping, terracing, etc., in the control of erosion.

The Hydrological Experiment Station at Coshocton is studying what happens to the rainfall in runoff, percolation, evaporation and transpiration; the effect of erosion control measures on the losses of water; and the effect of this loss on flood control.

These investigations will serve as a basis for planning for the soil conservation in Ohio. Through the educational work of the Extension Service, the program will be carried to the farmers.

Sealing Abandoned Coal Mines—Report from the Engineering Division of the Ohio Department of Health states that the work of sealing abandoned coal mines in Ohio, to reduce stream pollution caused by acid mine drainage, has continued since its inception in December, 1933. Abandoned mines have now been sealed in 24 counties with funds provided by the federal government through CWA, ERA, and later WPA. During the year 1937, 11,638 mine openings were closed at a total cost to the federal government of \$436,270.11, or \$37.49 per opening. Of this total cost, \$389,493.63, or 89.3 per cent, was expended for labor; \$9,133.54, or 2.1 per cent, for materials; and \$37,642.94, or 8.6 per cent, for engineering supervision and statistical records. The total number of openings closed to April 1, 1938, is approximately 34,000.

During the year 1937, 6,532 mine drainage samples were collected and analyzed in the Health Department Laboratory. Of 734 mines closed in 1937, the average number of openings was 16.3 per mine. The original acid drainage per mine in tons per year was 82.27. The construction cost per year per ton-original-acid was \$6.82. Up to November 1, 1937, the records of 566 mines showed reduction of their acid drainage content amounted to 28,560.39 tons, or 55.6 per cent per year.

On April 1, 1938, 1,820 men were at active work under WPA on this project which was being carried on in 20 counties. The program has been practically completed in Carroll, Mahoning, Meigs, Morgan, and Wayne counties. During 1937, 13 persons were given regular employment on the engineering supervision and statistical staff.

Exhibits of mine sealing work were shown in five leading cities in the state during the year (twice in Athens). A great amount of newspaper publicity was also obtained. The work will be continued to near completion in 1938. However, a continuing program on a smaller scale will be necessary because of the continual abandoning of openings and for constant supervision to assure that old sealings remain intact.

Department of Forestry—The Ohio Department of Forestry is furnishing fire protection to one million acres of forest land. There are an additional million acres which are not receiving protection due to insufficient funds. This includes several areas in eastern and north-eastern Ohio and approximately 150 square miles south and west of Toledo.

This Department is administering eight state forests and three state forest parks. These areas are visited by one-half million people annually, and on many of the tracts the chief activity of the ranger is the supervision of public use areas.

Six CCC camps remain in operation on the state forests. They are located one each in the following forests: Shawnee, Scioto Trail, Hocking, Zaleski, Mohican, and Bryan Park.

The Guy B. Findley State Forest at Wellington has been increased by gift to 890 acres. Mr. Hugh Taylor Birch has given four tracts of land which adjoin the John Bryan Forest Park as a memorial to Edward Orton. About 3,000 acres of state forest land have been acquired during the past year.

Tree distribution from the Department's nurseries will amount to approximately five million trees. Most of the trees have been used by farmers to reforest idle land.

One man who was added to the technical staff last October is devoting his time to research in farm woods. The Department is also conducting research in its forest arboretum at the Experiment Station and doing a considerable amount of personal service work with individuals and organizations throughout the State.

The Forest Tax Law which is administered by this Department, involves the part time duty of one forester.

Division of Conservation—During the past year the Division of Conservation has enlarged its fish and game management activities by dividing the State into seven game management districts and eleven fish management districts and placing a technical man in charge of each.

Wildlife management in the form of "cropping" the land and water is being stressed as the best solution to the wildlife problem. Law enforcement and artificial propagation are receiving attention, but the relatively new conservation technique, "Management," is due to grow rapidly in the future.

Ohio Wildlife Research Station—The Ohio Wildlife Research Station, co-operatively maintained by the Ohio State University, the Ohio Division of Conservation and the United States Biological Survey, is now in its third year. Its main office is on the Ohio State University campus, but much of the work is done at eight substations located in various biological units of the State.

The chief objectives are basic fact finding necessary for the conservation and development of the wildlife resources of Ohio, the training of skilled personnel competent to administer these resources, and demonstration and education projects leading to proper appreciation, management and utilization of them. To attain these objectives, a major research program is in progress, with research problems on Hungarian Partridge, Pheasant, Fox Squirrel, Gray Squirrel, Deer, Ruffed Grouse, Cottontail Rabbit, Raccoon, the Ohio breeding species of waterfowl and indirectly nearly all Ohio land vertebrates. A co-operative waterfowl banding project has been inaugurated at Pymatuning Reservoir in connection with more extensive studies of breeding waterfowl. More than 400 ducks have been banded to date.

Eight men are engaged in full-time research, assisted by a number of undergraduate students. The preliminary work on Gray Squirrel, Ruffed Grouse and Deer is completed, and one phase of disease investigation, "Parasites of the Gray and Fox Squirrel," is nearing completion. The development of techniques for measuring animal populations and methods of conservation management are also subjects of research and investigation.

In the development of an extension education program, assistance and advice have been given to 4-H club leaders and to many farmer-landowners whose inquiries have been sent to the Research Station. Papers on completed phases of conservation research have been distributed on request, in addition to many technical and educational papers. More than 75 lectures and radio talks have been given by the Station research men on various phases of wildlife conservation during the past year. A "Manual of Ohio Wildlife Resources," which will give qualitative and quantitative information on all wildlife groups in Ohio, is in process of preparation. A library relating to wildlife conservation is rapidly growing and is available to the people of the State.

For demonstration purposes, wildlife management units of township size have been set up in northwestern Ohio where effectiveness of "production" and "harvest" techniques are being tested and farmer-sportsmen relationships studied. The 52,000 acres of state owned forest lands in the unglaciated hills of southern Ohio have been used for research and demonstration of management methods.

Eight Wildlife Research Stations similar to the one in Ohio are located on a regional basis throughout the United States, bringing into close co-operation the large State Universities, the State Conservation Departments and the U. S. Biological Survey. The work of these stations is based on facts, not opinions, and involves the most careful application of scientific data and ecological principles, in modifying the land use program for the conservation of our valuable wildlife resources.

Roosevelt-Shawnee Project—A three-year wildlife research project sponsored by the Ohio Academy of Science is nearing completion on the Roosevelt Game Preserve. The investigation has been jointly supported by the Ohio Division of Conservation and the Ohio Wildlife Research Unit at Ohio State University. The investigator, Mr. F. B. Chapman, has been especially interested in wildlife land-use and forestry-wildlife relationships and has attacked the problem from those angles. Basic data on which a sound management program may be based, has been obtained on Gray Squirrel, Ruffed Grouse and White-tailed Deer (all forest game species). Preliminary work on the Shawnee-Roosevelt project will be completed by the present worker in August, 1938.

The gray squirrel study indicated that the Roosevelt area supported a population of only 10 squirrels per 100 acres during an excellent squirrel year. Squirrel populations fluctuated from year to year. A five-year cycle was rather definitely demonstrated. Three mimeographed publications dealing with various phases of the study have

been issued, and a summary report will soon appear in the Transactions of the Third North American Wildlife Conference. A 120-page research report dealing with the gray squirrel has been completed.

A deer population of about 1,200 exists in Western Scioto and Eastern Adams counties. The annual increment there is about 200 fawns. Approximately 100 deer are killed annually. The principal causes of deer mortality are, in the order of their importance: (1) poaching, (2) dogs, (3) highway accidents, (4) other accidents. The food supply is sufficient for the number of deer now present. The Ohio deer range should be extended in the next decade due to the reforestation trend in southeastern Ohio. A paper on "Trends in Land-use as Related to the White-tailed Deer in Ohio" will be given at the Ohio Academy of Science meeting at Wooster in 1938. A research report on this species is being completed.

About 1,000 ruffed grouse occur on the 9,000 acre Roosevelt Preserve. A 50-page research report has been completed. A mimeographed report on the "Breeding Birds of Nile Township, Scioto County" has been published as Release No. 40, Ohio Wildlife Research Unit.

During the past three years 14 permanent sanctuaries and refuges were established on state lands in co-operation with the Ohio Division of Forestry and the Division of Conservation. Sanctuaries are of four types: (1) wilderness areas for research, (2) recreational areas, (3) wildlife management areas, and (4) forestry management areas. Ten sanctuaries (involving 4,000 acres) are located in Scioto County (on Roosevelt Preserve and Shawnee Forest), two in Pike County (600 acres), and two in Ross County (600 acres). All state lands outside the sanctuaries are designated as "State Hunting Preserves." Controlled squirrel and rabbit hunting was permitted in 1935, 1936, and 1937. About 3,000 hunters were accommodated during that period.

In a study of the effects of timber management on wildlife, it was found that about 56,000 potential den trees were removed from the Shawnee Forest during stand-improvement work. However, the felled trees made the area more attractive for grouse, which utilized them for drumming logs. In general, timber management resulted in a greater production of wildlife foods. The relations of forest fires and severe floods to wildlife were also studied. Separate research reports on surveys of food, cover and water resources in the region have been completed.

The management program involved the preparation of 2,000 feet of clearings (100 feet wide) in forest areas, the construction of 15 log and rock dams, erection of deer crossing signs, provision of salt and winter feed for deer, cultivation and planting of annual food patches, cleaning and enlarging 16 deer licks and water-holes, permanent plantings of 60,000 game food and cover plants of 70 species in the Odell Sanctuary, and the establishment of a small nursery on the Roosevelt Preserve. The production of nursery stock in large quantities was impossible due to lack of watering facilities. However, 2,880 plants will be available for distribution to the seven wildlife management districts of the state in April, 1938.

Ohio Fish Management Program—The Ohio fisheries management program involves the arbitrary division of the State into eleven fish management districts, each consisting of a single large stream system, or a series of small similar stream systems, or a group of comparable lakes or ponds. A biologist is stationed in each district with headquarters at a university or college where he has access to laboratory and library facilities and can stimulate research upon important problems by the faculty and student biologists. It is the job of each of these men, called fish management agents, to become thoroughly familiar with the fish producing waters and their fish populations in his territory. Fish populations cannot be studied in their entirety, and the method of collecting representative samples is used. From the fish collected much information is obtained. Scales are taken and sent to headquarters where they are studied and measured, and the rate of growth is determined. Waters are considered to be carrying below their capacities when the fish have grown abnormally fast and such waters are supplied with more fish from the inland State fish farms. Fishes are supported by very complex food chains which may be varied and different for each species, and all details of these chains have not yet been discovered or formulated. Some studies of fish food production have shown little correlation with actual fish production, and studies of the growth rate and abundance of fishes in such waters have appeared to be the only criterion for judging their fish producing and carrying capacities.

There is a State fish hatchery at Put-in Bay where the eggs of commercial lake fishes are incubated and hatched, and the young fish are liberated in Lake Erie promptly after hatching. The south shore bays and island region of Lake Erie also provide good sport fishing and the excess fishes of the gamey species are transplanted to inland waters to improve fishing there. There are also about 3,000 acres of waters impounded for city waterworks which serve as rearing ponds because public fishing is not permitted in them and the fishes are transplanted to waters which may be fished. There are smaller establishments known as State fish farms located at St. Marys, Indian Lake, Buckeye Lake, Portage Lakes, Defiance, Bucyrus, Chagrin Falls, London, Xenia, Newtown, Piqua, and Kincaid Springs. At these places most of the practices of farm management are used, including pond bottom soil management, plant crop production (and weed control), intermediate animal crop production (small crustaceans), and lastly, fish production. Fish production is practised as a specialized phase of animal husbandry, including the development and maintenance of brood stocks of bass, bluegills, bullheads, forage minnows and crayfish. This involves the improvement of stocks by selective breeding, and the rearing of the young, with full attention to food, sanitation, and behavior requirements.

Since many land owners object to trespass by anglers, part of the Ohio fish management program involves the acquisition of control of stream margins by the State Division of Conservation. A number of land agents are employed to contact land owners and secure fishing

easements. Efforts are concentrated upon the streams recommended by the local sportsmen's organization, but will be extended presently to include all fishable streams in the State. These easements protect the land owner against property damage, as the State builds parking places for anglers' cars, builds stiles over fences, and exercises control over the fishing in the streams. Streams controlled by easements will be improved by erosion checks, small dams, deflectors, etc., and five crews of men will soon be operating throughout the State doing stream improvement work.

Research upon problems fundamental to the program is being conducted as a co-operative project with the Franz Theodore Stone Biological Laboratory of the Ohio State University. Some of the problems being investigated are the effects of small dams in streams upon fish food production and upon the fish populations present, migrations of stream fishes, viability of winter eggs of water fleas, prevalence and control of fluke infections of fish, effects of flood waters on stream fishes, distribution of mussels in Ohio streams, effects of turbid waters on aquatic plants, cycles of fluctuations of abundance of game fish species, and methods of producing bait minnows and crayfish.

Recommendations—Your Committee recommends:

(1) That the Ohio Academy of Science go on record favoring an annual appropriation from the general revenue funds sufficient to permit the Ohio Forestry Department to purchase submarginal lands for forestry and recreational purposes and for personnel sufficient properly to care for such lands.

(2) That suitable legislation be enacted to permit the state to take over such tax delinquent land as may be desirable for purposes of recreation or conservation when unpaid taxes shall have accumulated for three years, the title to such lands to be held by the Forestry Department, the Division of Conservation or the Ohio State Archaeological and Historical Society.

(3) That a joint meeting of the forestry and wildlife interests of the state be held, for the purpose of securing further co-operation between and co-ordination of the two fields of endeavor toward the end of better conservation of our natural resources.

(4) That suitable legislation be enacted toward outlawing pole-traps. It is the firm conviction of your committee that the pole-trap, except in a few cases, is objectionable because it destroys more beneficial birds than destructive ones.

(5) That further areas at Fort Hill, the Oak Openings west of Toledo and at Mohican State Park be acquired for conservation and recreational purposes. Your committee also especially recommends for this purpose the acquisition of land in the vicinity of Beaver Creek in Columbiana County, Rock Run in Jackson County, and marsh areas along Lake Erie.

(6) That suitable literature be provided relating to our State recreational areas for distribution to visitors to such areas.

(7) You committee commends the important research on wildlife problems which has been accomplished in the Scioto and Pike County State properties, and urgently recommends that such research be continued.

(8) Your committee reiterates its firm opposition to pest hunts and "vermin" killing campaigns and to indiscriminate poisoning campaigns directed against our native mammals or birds.

Respectfully submitted,

G. W. CONREY,	EDMUND SECREST,
E. L. WICKLIFF,	LAWRENCE E. HICKS,
ARTHUR T. EVANS,	F. H. KRECKER,
EMERY R. HAYHURST,	WILBER E. STOUT,
	EDWARD S. THOMAS, <i>Chairman.</i>

Bird Books

These two volumes contain the series of articles on North American birds that have appeared from time to time in the last several years in the *National Geographic Magazine*. The 37 articles in the two volumes treat not only all the orders of birds in North America north of Mexico, but also various special subjects such as migration, bird banding, song-recording, and many others. These volumes are profusely illustrated, containing 204 pages of color plates which illustrate about 950 varieties of birds, 228 photographs, 17 migration maps, and 5 pen and ink drawings illustrating structural characters of birds. The color plates, except for a few of warblers drawn by Fuertes, are by Major Allan Brooks. Opposite each color plate are brief accounts of the species illustrated, including their characteristics, range, breeding habits, and interesting features of their behavior.

This work throughout is written in a popular and readable style, with which readers of the *National Geographic Magazine* are familiar. Technical details are reduced to a minimum. The color plates, for the most part, are excellent. The two books are well bound, and printed on a good grade of paper. The table of contents in each volume is listed alphabetically according to the first word of each article heading, which appears somewhat inconvenient, but each volume is fully indexed.

"The Book of Birds" should prove of considerable interest to both biologists and laymen. The student of birds will find much of value in the treatment of the various species and groups, and in some of the articles on special subjects. The article on bird migration, by Frederick C. Lincoln, is particularly good; this article is an abridged version of Lincoln's "The Migration of North American Birds" (U. S. D. A. Circular No. 363), but it has lost nothing in being abridged. Anyone interested in nature will find in these volumes a wealth of accurate and interesting information and illustrative material. Here is a set of books which seems well worth the small price of five dollars.—*Donald J. Borror.*

The Book of Birds, edited by Gilbert Grosvenor and Alexander Wetmore. Vol. 1, viii+356 pp.; Vol. 2, 123 pp. Washington, The National Geographic Society, 1937. \$5.00 per set, obtainable only from the Society's headquarters, Washington, D. C.

PRESIDENTIAL ADDRESS

"WHEN ARE WE SCIENTIFIC?"

C. G. SHATZER,
Wittenberg College

No one will question the statement that frequently there arises in the mind of the undergraduate and graduate student the inquiry: Where and how does this particular day's work fit into the pattern of thought and learning? Related to this inquiry is a second one: What are the tests to which this work must be subjected in order to judge the quality of its truth and worth? The fact that these questions arise in students' minds has not been given adequate attention by teachers to whom the training of youth has been entrusted.

If professional people will keep these ideas in mind their own methods of thought will be improved and they will frequently correlate the specific task with the larger problem, thus maintaining perspective for those with whom they work.

The mental concentration necessary to the successful completion of an immediate problem frequently excludes a grasp of that whole of which the day's work is a part. Thus perspective in thought, freedom of spirit, and incentive to enthusiastic action are lost. The exploration of a single, minute island of thought is likely to delay, if not prevent the discovery of the archipelago of knowledge. Circumstances and habit tend to confine our thinking within rather limited areas. It may prove interesting and profitable to detach our minds from the specific problems in which we have been interested today and review some of the broad premises upon which research depends. As a revered graduate school instructor was accustomed to say: "The review of an old problem along distinctive avenues of approach is constructive and creative thinking." I have no hesitancy, therefore, in directing your thought to an old, yet ever-new problem—"When are we scientific?"

The primary function of this paper is to raise the questions: Is a scientific method in one field of thought necessarily a scientific method in another? Are the criteria of scientific quality in one field of learning the criteria of truth and reality in all fields of learning? My tentative answer to each of these questions is "No." Are there specific tests of reality that are intrinsically a part of one field of thought that are not tests in another field? My answer is "Yes." Furthermore, these tests are the critical tests of scientific quality in the specific field. The intent is to direct attention to the fact that scholars researching in any field become convinced that their thinking and experimenting are scientifically done. This attitude of mind possesses distinct merit. Unfortunately they unconsciously draft the corollary that they have devised the only scientific method. This is an unscientific deduction. As a mother looking fondly at a passing regiment said: "They are all out of step but our son Jim."

The indiscriminating use of the terms science and scientific has contributed a great deal of confusion to our thinking. The evolution of the physical, the biological, and the geological sciences has so dominated thinking that whenever the word "science" is used there is a connotation that the reference is to one of the above sciences. A concomitant error is involved in the use of the word "scientific." Unintentionally the methods of investigation and the criteria of validity employed by the physical, biological, and geological investigators have been accepted as inseparably associated with, if not the embodiment of, scientific thinking. This persistent association of the word scientific with those sciences is unjustifiable. "He is a scientific thinker" is a typical use of the word and connotes something infinitely more than compliance with the techniques of the physical sciences. As thus used the true meaning is that the worker subjects his information to those tests of validity that are of the essence of the information with which he is working, and that he subjects his methods to the tests of rectitude intrinsically associated with a specific field of thought. These tests are not necessarily the measures of scientific quality employed in physics, chemistry, biology, or geology. A deliberate effort should be made to divorce the word "scientific" from the implied relation to the sciences: physics, chemistry, biology, and geology, except when designating the quality of the work done in these subjects. There are accurate and valid tests of the quality of the information and of the methods of thinking in history, geography, theology, and philosophy, that are as scientific for these fields of thought as are the accepted tests for physics for that subject. That some of the tests are valid in several fields is a reasonable assumption, but it is just as reasonable to assume that there are inherent tests for a specific field which are not common to any other field.

The above use of the phrase "fields of thought" is an attempt to limit the discussion of the question "When are we scientific" to categories and thereby simplify the problem. There is an infinite number of subjects of thought, but since the universities and the colleges have organized their curricula upon a group or division plan, it is reasonable to assume that there are inherent likenesses and similarities running through the subject matter and methods of thinking employed in a group. If such is the case a list of the tests of scientific quality derived for a subject such as physics, will be typical of, and applicable to, that field of thought commonly designated as the Physical Sciences. Furthermore, defining the tests of validity of information and the methods of thinking in a subject such as geography, in the social science group, ought to establish the criteria of scientific thinking in the social science field and thereby define the major criteria of scientific thinking in history, biography, economics, geography, political science, sociology, and psychology if it is classed as a social and not a physical science. Thus the limits of the problem are narrowed and a survey of the question "When are we scientific" may be confined to two of the five or seven groups generally outlined in college catalogs.

The primary premise is: Each field of thought possesses criteria of truth inherent in, and organically a part of it, which are the essential

measures of its scientific quality, but not necessarily tests of validity in other groups. If this premise is tenable, then a catalog of the criteria in each field should be made. Any scholar must accept the tests of validity recognized in fields other than his own if he wishes to justify his claim to scholarship in his own field. Furthermore, no one field of thought can impose its tests upon another field and insist that they be considered valid tests of truth thereto, unless they give evidence of belonging organically to the field.

I choose to undertake the study of the following two groups chosen from the college catalogs, in an effort to list some of the criteria of scientific quality of each:

1. Physical Sciences: chemistry, mathematics, physics.
2. Social Sciences: including biography, economics, geography, history, political science, psychology, sociology.

The principles of logic are universal prerequisites of scientific thinking. The syllogism, types of terms, definition, and classification, valid moods and other statistical forms, hypothetical and disjunctive arguments, analogy, and similar principles of reasoning are universal tests of scientific quality. They are not the specific tests by which scientific thinking in one field may be differentiated from scientific thinking in another field. The present quest is for those specific tests of scientific quality that characterize the physical sciences, but are different from the tests for the social sciences and all other fields of thought. The following two discussions attempt to segregate and catalog the tests for the physical and for the social sciences. It would be folly to claim that this treatment is exhaustive. The primary intent is to state a problem in an objective way.

Two lines of investigation have been pursued during the past two years in the search for definite statements of criteria of scientific quality of thinking in these two fields.

First: The dissertations presented for the advanced degree of Ph.D. in various institutions have been examined in search of some principles which were employed in testing the scientific quality of the research. It was discovered that the dissertations in any department are confined to a narrow field, and the dissertations directed by any one man are restricted to a more limited field. That should be the situation. A further examination reveals the fact that the method employed in the original dissertation, probably the director's own dissertation, is practically duplicated in the successive theses. Similar materials and identical or analogous circumstances have been introduced, but in reality there are no fundamental differences between problems. One of the striking illustrations is in taxonomic problems in biology. All that is to be found in these theses is an amplification of a problem previously explored. Such a discovery leads to the conclusion that well-defined tests of scientific quality have not been consciously employed, but that a pattern was constructed in the original dissertation and the scientific quality of successive dissertations has been judged upon the basis of how well they conformed to that pattern. All such research is commendable and certainly makes valuable contributions to knowledge.

The disturbing deduction must be that the "ruling theory" or "authoritarian method" of thinking has been the dominating test of scientific quality employed. Strange to relate, this method has been severely criticised by experts in the physical and biological fields when employed by investigators in other fields.

This line of investigation did not yield specific statements of criteria of scientific quality.

A second line of investigation was followed. A search was made in the books and journals that discuss methods of research, investigation, and thesis writing to locate, if possible, the criteria by which the scientific quality is judged. Brief references are made to the problem in the books and journals, but no inclusive catalog was found. The books of logic define clearly the principles of logical thought. However, it is not logic's function to define the basic criteria of truth and reality, or the scientific quality of thinking peculiar to a specific field of thought such as physics or philosophy.

With these two lines of investigation as a background the writer attempts to develop a brief list of the criteria of scientific quality for each of two fields: the physical sciences and the social sciences.

Quest number 1—The Physical Sciences:

Each of the so-called fields of thought is concerned in its own way with the interpretation of the world. Departmentalizing subject matter and collecting the departments in fields of learning is artificial and is a response to the limitations of the human mind which demands that knowledge shall be classified and cataloged. Classifying knowledge always suggests a simplicity that does not exist. Man thinks in types which represent ideal conditions. He infers that principles applicable to the type or type conditions are tests of reality for the group even into the twilight zone where the group amalgamates with other groups, or conditions merge with adjacent conditions.

Physics and chemistry deal with materials in terms of constants. Non-variability is a fundamental consideration to the physical scientist. He has constructed his method of investigation upon the advantage that non-variability gives him. In the words of Ritchie, "He assumes, for instance, that in considering a small portion of the universe he can neglect all the rest."¹ When he has finished with that small bit "He looks around and brings another small bit of the universe into his ken, and continues altering his field of observation until his isolated system behaves as though it were really isolated. All the time he is able to leave the whole universe as such, alone; he gets all the advantages he could have got out of a theory of the universe without the disadvantages."¹ Ordinarily he does not attempt a summation and to a much less degree an integration of the units.

Pure science deals with these isolated units. Probably the only distinction between pure and applied science is that applied science is concerned with the relation between the isolated units of pure science. Out of these inquiries of pure science emerge those criteria that are the bases for judging the scientific quality of the work.

¹Ritchie, A. D., *Scientific Method*, p. 7.

Whether a piece of work is scientific or not in the physical sciences may be measured by the following tests:

1. Has the human factor been eliminated or reduced to a constant in performing the experiment and in recording results and observations?
2. Has the material or the action been resolved into a single isolated unit? Have the variables been reduced to one?
3. Has simplicity been attained?
4. Have the results been attained by both a direct and indirect attack, i. e., can the results be secured by a process of elimination, or as a residuum of the solution of associated problems?
5. Can the results be expressed in a mathematical formula of quantitative, not descriptive terms? Sumner has said, "Science is science—only insofar as it is capable of mathematical expression."² In the physical sciences, each function in the formula must be capable of calibration. There are some fields of thought in which the facts that determine reality are not amenable to calibration.
6. Any description of characteristics and interpretation based upon observation in natural settings must be checked repeatedly and confirmed in a man-devised experiment.
7. Identical results must be secured by independent investigators using the identical methods and materials of the original investigator.

There are three well-known methods of investigation:

1. The Ruling Theory—Authoritarian.
2. The Working Hypothesis.
5. The Multiple Working Hypotheses.³

The human mind possesses an irrepressible tendency to resist the invalidation of any explanation of a phenomenon that it has proposed. The fact that this tendency exists demands that some method of investigation shall be devised that will automatically annul it. Many people cannot say, "I do not know." They employ the "ruling theory" or "authoritarian method" in their thinking. This attitude of mind is a hangover from the day when a scholar could compass the whole of human knowledge, when most of the information and training were in possession of a limited few. The scholar then made plausible explanations of phenomena that were readily accepted as true. Thus developed the "ruling theory" or "authoritarian" process of working. As Emerson said, "We hate to think"—and hope that some one will save us that discomfiture by producing a formula for action. The investigator should be conscious of this tendency and devise methods to render impossible its practice.

The single hypothesis procedure possesses the same weakness of permitting men to give undeserved protection to a brain-child.

²Sumner, Frances B., *Scientific Monthly*, Vol. XXV, No. 4, October, 1937, p. 345.

³*Journal of Geology*, October, November, 1897, Chamberlin, T. C. Vol 5, No. 8.

The question naturally arises, Is there any method available which mechanically eliminates this tendency toward the expression of prejudice?" If such a device is available it ought to be discovered most readily in the physical sciences since they deal with the inanimate.

The "multiple working hypotheses method" utilizes the process of elimination to a high degree, consequently its use might be considered a criterion of scientific quality in investigation. Any one will acknowledge that building cognate hypotheses is difficult. Nevertheless there is merit in the severity of the task. As the investigator builds the several hypotheses he unavoidably discovers new ideas, observes new conditions and relations that he may not suspect exist when the authoritarian or single hypothesis method has been employed.

Quest number 2—The Social Sciences:

Man and man's activities are the central ideas in the social sciences. These premises must be accepted when a question is raised concerning the scientific quality of the work done by investigators working in the field. The central idea is the interpretation of the responses of life forms to the social and physical environment. In his research work the historian, the economist, the biographer, the political scientist, is confronted with more than the immediate environment—he must deal with the biological heritage, the social heritage, the philosophy and experience of the individual as well as of the group of which he is a part.

The period when the major function of the historian, the political scientist, the economist, and the geographer, was fact finding and the recording of information is past. That was a very important period in social science history. The present is a period when interpretation is the major objective of research. This fact is of supreme importance and demands major consideration in any attempt to set up standards of scientific quality for the work done in the social sciences.

The ever-changing, dynamic world doctrine is generally accepted. This fact demands that some new criteria of truth, inherent in, and organically a part of the social sciences, must supplement the previously-accepted tests of the scientific quality of research. Furthermore, it is absurd to superimpose upon the man-centered social sciences the tests of validity of mathematics and physics which are primarily concerned with the inanimate. Those tests possess a limited application, but are not inclusive of all tests nor are they the fundamental ones.

May it be true that students of social sciences, education, philosophy, and religion permitted themselves to be hurried into changes of procedure by the success of investigators in the fields of physical science, biological science, and thereby became imitators when they should have examined their own premises and developed methods consistent with the inherent characteristics of their own fields.

Educational statistics exhibit, in a striking degree, the agonizing efforts a field of learning experiences when it attempts to ape the successful technique of another field of learning and to use methods that are not inherently applicable to itself. The formulae used in statistical methods in education are not formulae. Their symbols are not the

language of constants, but of variables that are wholly descriptive—not definitive. It is quite proper to use these formulae if it is recognized that the symbols represent descriptive terms. It must be recognized that they are not mathematical formulae—they just simulate formulae, hoping thereby to gain greater respectability in an age when an unjustifiable attempt has been made to subject all scientific quality to quantitative measures.

Man is a complex organism, the animate and inanimate environment in which he moves is complex, the parts inseparably interwoven and integrated—consequently it is impossible to set parts of the environment or responses off as units by themselves and deal with them as separate units as is done in the physical sciences. The very nature of the social sciences precludes the possibility of considering a small portion of the universe by itself and neglecting all the other parts. Consequently, we may be compelled to accept the training and character of the man who makes the interpretation as the best criteria of validity of thought. If such is the case, we must test the quality of his research by testing the researcher for his capacity to discover significant information and test the quality of that information; for his alertness to existing conditions, and logical, effective summarizing. Thus we arrive at the idea that there are at least two measuring scales by which we test the scientific quality of investigation in the social sciences:

First: We judge the quality of the research by evaluating the training of the writer. Is he trained in the mechanics of scholarship, i. e., trained in paleography, in lexicography, in rhetorical expression; is he able to analyze his premises and judge whether there is unity and continuity in his own thought and writing, as well as able to compare and contrast his work with that of scholars in the identical and similar fields?

Second: We judge the quality of the research by evaluating the personal qualities of the worker—his philosophy of life, attitude of mind, i. e., his sympathies, enthusiasms, personal interests, prejudice, envy, malice, his experience in the world of reality, and his ability to live successfully with men. This group of tests in reality is a test of the character of the worker.

The experience of the worker in the social sciences is a major test of the scientific quality of his work. There are two types of experience: actual and vicarious. To a degree it is possible for a geographer to be so thoroughly informed concerning the habitations, the tools, the religion, the social customs of a human group living a life of isolation in a dissected upland that he becomes a part of a Scottish clan that he may live, to a degree, the life of Scott's Roderick in the "Lady of the Lake," or, he may visualize the life of the mountaineer of our Appalachians until he can approximate the feud, blood-retribution spirit of the Hatfields and McCoys. However, his vicarious living can only approximate reality and the approximation of the reader of his description will be of lesser degree. The fact is that the vicarious experience of the reader of the geographer's interpretation can never equal actual experience. There is no subjectivity that can possibly replace objective experience.

It is difficult for us to accept these tests as criteria of scientific quality of the geographer's and economist's work simply because we have become so greatly enamored of the quantitative methods of the physical sciences and are suspicious of qualitative tests. Nevertheless, they are the specific tests of scientific quality in the social sciences simply because they are of the very essence of them.

The tests of scientific quality in the social sciences are at the extreme opposite pole from the tests of scientific quality in the physical sciences. They express a contrast that naturally exists.

In summary: Students classify their knowledge in compartments that have been designated fields of thought. In all classifications it is the ideal, representative subject matter and ideal method of thinking that are considered when the particular field is named. Little if any thought is given to the zone where one field passes indistinguishably into another field. There is subject matter and there are methods of treating information that are common to all the fields of learning. There are tests of scientific quality that are common to several, but not to all fields. The significant fact is that there are a few tests that are the specific tests of validity in a particular field and these are the tests that should be given the greatest weight in evaluating the scientific quality of the studies in that field. Helmholtz acknowledged the existence of this idea when he pleaded for an increased and closer connection of the points of view of the various sciences especially when these dealt with the same subject or similar subjects.⁴

If these specific differences can be clearly defined, scholars will have at their command the tools by which to judge scientific quality. Definitions can be made and when they are made scholars in any field will have at their command criteria by which to judge the work in that field. Possibly the day may come when the physical scientist will not accuse a worker in the field of philosophy and religion of being unscientific because he has not employed the tests of physics and chemistry in his work. When these definitions are made then students are going to acquire a finer appreciation of one another's work; are going to be more sympathetic with one another's endeavors; and are going to be more scientific in their appreciation of the whole rather than parts of knowledge.

This brief review of a problem is presented with the hope that other analyses may be offered and that both graduate and undergraduate students may be aided in their quests for statements of tests of scientific quality of investigation.

⁴Jones, W. Tudor, *Contemporary Thought of Germany*, p. 129.

HEREDITY AND EDUCATION¹

PAUL POPENOE

Every human being begins life as a microscopic speck of jelly—the fertilized egg cell. From this in the course of nine months, with the addition of nothing from the outside except food and water, he develops into the baby we see at birth.

Obviously, the traits he shows at birth are not the product of education in any ordinary sense of the term. They are the product of the development of inborn potentialities that are largely independent of educators.

The same is true of many other traits that appear not at birth but some time later. The teeth will appear in due time, the beard in due time, the bald spot in due time—no one imagines that the appearance of these has been brought about or largely influenced by education.

Should we not begin to recognize that the same is true of many other traits, intellectual and emotional as well as physical? Recent breeding experiments with lower animals, showing clearly that such traits as temperament and emotional sensitivity are inherited, should lead us to be more realistic in our treatment of students either in higher or lower schools.

To a greater degree than we have sometimes admitted, a large part of the child's development represents not the skill of his teachers, but the unfolding of his inherent potentialities. These appear at definite rates of maturation, and nothing can be done to hurry them. The parent who tries to teach a child to walk simply interferes with his ability to walk. The child does not learn to walk—he grows to walk and will do so best if left alone and given a chance.

Just as every trait has its own rate of maturation, so every child has his own rate. Every child is unique, and "standard tables" of heights, weights, ages of walking, talking, teething and the like, have little meaning or value for use with individuals.

If we are to take account of these inherited differences in dealing with children, we should pay more attention to the greatest inherited difference that can exist between two chil-

¹Abstract of invitational address before the Forty-eighth Annual Meeting of the Ohio Academy of Science, at the College of Wooster, May 6, 1938.

dren—that which makes one male and the other female, respectively.

Not only do the two sexes differ, literally, in every cell of their bodies, but they differ in many ways, biologically, that are of profound importance in education. They differ in their viability (more boys dying at every age); they differ in their basal metabolism—girls averaging 10% lower than boys, a fact that may be associated with the greater aggressiveness of the male. They differ in structure, in function, in glandular make-up and balance, in emotional equipment. They mature at different rates, girls being a year or more ahead of boys by the time they reach high-school.

This difference in rate of maturation causes many difficulties. Because we start boys and girls off together in the first grade at the age of six, and move them along together from year to year, we are always forcing boys to compete with girls who are superior to them—more mature socially and emotionally. Such a handicap is bad for both sexes.

Development of the reproductive system offers one of the difficult problems that educators have failed to take into account. The long period of years during which the reproductive system is developing makes it much more susceptible to damage from outside conditions than is the digestive system, the nervous system, or some other part of the body that has a short, direct process of development concluded largely in a few months, even before birth, as compared with a quarter of a century during which the reproductive system is developing in women. There are two serious consequences that educators should take into account:

1. At adolescence, the girl's reproductive system has to undergo profound transformations to change in a few years from that of a child to that of a woman. This process—much more profound than in boys—makes a heavy demand on the girl's store of vitality. If she has not enough vitality—if she is using up her vital capital by too great physical activity as in competitive athletics, too great intellectual activity as in working for a scholarship, too great emotional activity as in an immoderate social life—the transformation of the reproductive system can not take place. She remains a child in that respect, though she becomes a woman in other respects. This failure of development of the reproductive system, due to carrying too heavy a load of activity during adolescence, is

apparently the most important single cause in the permanent sterility of so many educated women. In a study of sterility among such women, it was found that one-third of them suffered from this form of physical infantilism.

2. This profound change in the reproductive system, on the other hand, seems to influence the girl's intellectual development unfavorably. In a study at Stanford University, of very bright girls in the California public schools, it was found that they showed a decline in average intelligence, amounting to 13 points on the scale of intelligence quotients, during adolescence, while their brothers showed little or no such change. When a girl is born with the highest possibilities of intellectual achievement, it appears that she must sacrifice some of that possibility during her adolescence in order to prepare herself biologically for motherhood.

This problem of dealing with intelligent girls at adolescence, in such a way as to promote both motherhood and intellectual development, is one which educators have almost wholly ignored. Sometimes the results of this ignorance have been disastrous.

Constitutional differences within each sex also deserve more attention. Two extremes can be recognized readily enough, with most of us somewhere in the middle. At one extreme is a slender type of body-build associated with the introvert personality—a mind which tends to turn inward, to be concerned with its own thought processes. At the other extreme is the thick-set type of body-build associated with the extravert whose attention is turned outward—who is concerned with other people rather than himself, with what is going on around him rather than what is going on inside his own skull.

A gathering of scientists, inventors, or poets is likely to consist mainly of introverts. It will look different and behave differently from a gathering of extraverts such as one would find at a convention of Elks or Shriners or in a caucus of politicians.

These contrasted types often appear in the same family, because of the mixture of traits in the ancestry. They need to be handled differently. The introvert child must be continually pushed out and made to associate with people, so that he will not become a timid recluse. The extravert child needs to be encouraged to concentrate, so that he will not become a superficial show-off.

Their vocational futures will normally be different. The introvert will excel in a job requiring persistence and attention to detail. He will work well alone. The extravert will do best when associating with other people.

Because the child's traits are the outcome of his ancestry, and because his parents know his family background better than anyone else does, his parents should be the best educators. Under city conditions, it is inevitable that the job of educating children be turned over largely to school teachers; but it is easy to carry this too far. Parents are still mainly responsible for the child's education in matters pertaining to health, character, and religion. With better training for parenthood, such as the schools are now beginning to give, parents should be able to do a much better job, particularly in the development of such parts of the child's heredity as form the basis of good character and personality, and the suppression or circumventing of such of his potentialities as are socially undesirable. Beyond this, a closer tie-up between home and school is obviously needed, if the teachers are to understand the material they have to work with.

Geology Simplified

The author has admirably achieved his objective, stated in his subtitle, by treating the earth as a fascinating story stripped of strange and confusing language. Professor Shand is a British geologist who recently came to this country to take a professorship at Columbia University. Prior to this he lived for several years in South Africa. His book is a somewhat modified form of the 1933 edition published in England.

Although the work touches upon the geologic development of the surface features of the earth, its greater concern is with the hidden aspects of the earth's crust and interior, along with the dynamical problems involved. Such chapter headings as "The Book of the Rocks," "What Lies Beneath the Crust," "Deeper and Deeper," "The Problem of Mountains," "How the Crust Is Held Up," and others, express the tenor of the story. Where mathematical equations are needed the author has resorted to ingenious simplicity which fascinates the reader. Considering the history of the author and the book one understands the emphasis placed upon European and African examples and illustrations. By the same token the trend of European geologic thought is explained. It is indeed unfortunate, however, that the author should be so "sold" on the spectacular hypothesis of drifting continents as to conceal from his readers the opposing and more generally accepted views. Nevertheless, this book should succeed in arousing additional interest in the fundamental and broad problems of earth science.—*Paris B. Stockdale.*

Earth-Lore: Geology without Jargon, by S. J. Shand. viii+144 pp. New York, E. P. Dutton & Co., 1938. \$1.25.

ADDITIONS TO THE REVISED CATALOG OF OHIO VASCULAR PLANTS, VI.*

JOHN H. SCHAFFNER

Our knowledge of the flora of Ohio continues to be augmented because of the enthusiastic work of many amateur collectors in various parts of the state. During the past year, through the aid of four student NYA workers, more than 2,000 specimens have been mounted and added to the Ohio State Herbarium, and a considerable number of specimens have also been added to the general herbarium collection. Among the Ohio specimens are sixteen species of vascular plants new to the state list. Numerous other records extend the known distribution range in the state. Thus, much material is being accumulated which will be of great value in the future study of the vegetation of Ohio. The card index with Ohio records indicated by counties on the card maps is nearing completion and will be of great assistance in facilitating distribution studies of the species.

- 10.1. *Lygodium palmatum* (Bern.) Sw. Climbing-fern. In thicket at edge of old abandoned quarry. Good Hope Twp., Sect. 26, Hocking Co. Mary N. Thomas, John S. Thomas, and Edward S. Thomas.
12. *Polypodium polypodioides* (L.) Hitch. Gray Polypody. Ohio Twp., Gallia Co. Floyd B. Chapman and Conrad Roth.
- 28a. *Asplenium cryptolepis ohionis* Fern. Ohio Wall-rue Spleenwort. Buzzard Rock, Adams Co. Leslie L. Pontius and Floyd Bartley.
55. *Equisetum kansanum* Schaffn. Kansas Scouring-rush. Hallsville, Colerain Twp., Ross Co. Leslie L. Pontius and Floyd Bartley.
59. *Equisetum fluviatile* L. Water Horsetail. Goodman's Bog, Green Twp., Ross Co. Floyd Bartley and Leslie L. Pontius.
64. *Lycopodium inundatum* L. Bog Club-moss. In swale in old quarry abandoned thirty years ago. Good Hope Twp., Sect. 26, Hocking Co. W. H. Walker and Edward S. Thomas.
- 70.1. *Picea rubra* Link. Red Spruce. On top of shale ridge. Probably escaped or accidental. Cascade Hollow, Big Creek, Concord Twp., Lake Co. C. A. Dambach and J. W. Sites.
- 81.1a. *Echinodorus cordifolius lanceolatus* (Engelm.) Mack. & Bush. Liberty Twp., Ross Co. Floyd Bartley and Leslie L. Pontius.
- 82.1. *Sagittaria longirostra* (Micheli) J. G. Sm. Long-beaked Arrow-head. Buckeye Creek, White's Gulch, Rock Run, Bowles Hollow, and Opher Hollow in Liberty Twp., Jackson Co. and in Green Twp., Ross Co. Leslie L. Pontius and Floyd Bartley.
89. *Triglochin palustris* L. Marsh Arrow-grass. Green Twp., Ross Co. Floyd Bartley and Leslie L. Pontius.
- 101.1. *Potamogeton crispus* L. Curly Pondweed. State Fish Farm No. 10. Portage Lakes, Summit Co. Fred H. Glenney. Lake O'Springs, Jackson Twp., Stark Co. Don M. Brown.

*Papers from the Department of Botany, The Ohio State University, No. 402.

119. Change name to *Anacharis canadensis* (Mx.) Planch. Common Water-weed. Cuyahoga, Summit, Erie, Allen, Licking, Pickaway.
- 119.1. *Anacharis planchonii* (Casp.) Rydb. Narrow-leaf Water-weed. Ash-tabula, Geauga, Stark, Lorain, Erie, Williams, Logan.
- 119.2. *Anacharis occidentalis* (Pursh) Victorin. Lesser Water-weed. Wayne, Fairfield.
- 144.1. *Scirpus georgianus* Harper. Georgia Bulrush. Kirtland Twp., Lake Co. J. W. Aldrich.
- 150.2. *Scirpus pauciflorus* Lightf. Few-flowered Clubrush. Immell's Bog, three miles northwest of Kingston, Ross Co. Floyd Bartley and Leslie L. Pontius.
154. *Fimbristylis autumnalis* (L.) R. & S. Slender Fimbristylis. Pickaway Twp., Pickaway Co. Floyd Bartley and Leslie L. Pontius.
174. *Cyperus inflexus* Muhl. Awned Cyperus. Pickaway Twp., Pickaway Co. Floyd Bartley and Leslie L. Pontius.
180. *Cyperus diandrus* Torr. Low Cyperus. Joos Swamp, Hocking Twp., Fairfield Co. Chas. R. Goslin.
287. *Carex flexuosa* Muhl. Slender-stalked Sedge. Washington Twp., Pickaway Co. Floyd Bartley and Leslie L. Pontius.
325. Change name to *Arundinaria gigantea* (Walt.) Chapm. and add "Spreading on a high ridge from plantings made before the Civil War." Brush Creek Twp., Scioto Co. Conrad Roth. Add also, "On the ridge above Revenge, Fairfield Co. Spreading apparently from an originally planted specimen." Lewis K. Cook. Note: *A. tecta* (Walt.) Muhl. is apparently only a form of *A. gigantea*.
385. *Arrhenatherum elatius* (L.) Beauv. Oat-grass. Near New Vienna, Clinton Co. Katie M. Roads.
390. *Deschampsia caespitosa* (L.) Beauv. Tufted Hair-grass. Immell's Bog, three miles northwest of Kingston, Green Twp., Ross Co. Floyd Bartley and Leslie L. Pontius.
395. *Sporobolus vaginiflorus* Torr. Sheathed Rush-grass. Between cement sidewalk and curbstone. Columbus, Franklin Co. John H. Schaffner.
411. *Alopecurus pratensis* L. Meadow Foxtail. In water in a ditch, escaped. O. S. U. Campus, Columbus, Franklin Co. R. A. Dobbins.
- 412.1. *Alopecurus carolinianus* Walt. Carolina Foxtail. (*A. ramosus* Poir.) Marion, Marion Co. C. J. Willard.
413. Change name to *Alopecurus aequalis* Sobol.
- 421.1. *Muhlenbergia cuspidata* (Torr.) Rydb. Plains Muhlenbergia. Buzzard Rock, Adams Co. Floyd Bartley and Leslie L. Pontius.
430. *Aristida purpurascens* Poir. Purplish Triple-awned-grass. Oak Openings, Lucas Co. Floyd Bartley and Leslie L. Pontius.
499. *Leptoloma cognatum* (Schult.) Chase. Fall Witch-grass. Green Twp., Ross Co. Floyd Bartley and Leslie L. Pontius.
500. *Syntherisma filiforme* (L.) Nash. Slender Crab-grass. Pickaway Twp., Pickaway Co. Floyd Bartley and Leslie L. Pontius.
546. *Muscari comosum* (L.) Mill. Blue-tufted Grape-hyacinth. Adams Co. Olga Zurcher. In herbarium of Capital University.
575. *Clintonia umbellulata* (Mx.) Torr. White Clintonia. Three miles S. E. of Dundee, Tuscarawas Co. Don M. Brown.
- 629.1. *Iris pseudacorus* L. Yellow Iris. From Europe. Growing very abundantly around Meyers Lake, near Canton, Plain Twp., Stark Co. Don M. Brown.
655. *Ibidium ovale* (Lindl.) House. Small-flowered Lady's-tresses. On a hill west of Athens, Athens Co. W. P. Porter.
669. *Tipularia unifolia* (Muhl.) B. S. P. Crane-fly Orchis. Gallia Co. Leslie L. Pontius and Floyd Bartley.

781. *Lepidium perfoliatum* L. Perfoliate Peppergrass. A single plant. Barnesville, Belmont Co. Emma E. Laughlin.
808. Milton Hopkins has segregated our American plant from the Eurasian *Arabis hirsuta* (L.) Scop. as a new species, *Arabis pycnocarpa* Hopk. with the following characteristics: Style 0.5-0.9 mm. long; silique 3-5 cm. long, flat, one-nerved only to the middle of the silique or slightly beyond; seed winged all around narrowly, but very broadly so at the apex; cauline leaves close together on the stem.
814. *Arabis drummondi* Gr. Drummond's Rock-cress. Hopkins reports specimens collected by Moseley from Cedar Point, Erie Co., and Green Island, Ottawa Co.
815. *Arabis brachycarpa* (T. & G.) Britt. is invalidated by the homonym rule and our plant becomes *Arabis divaricarpa* A. Nelson, according to Milton Hopkins.
853. *Geranium pusillum* L. Small-flowered Crane's-bill. Hamilton, Butler Co. E. E. Good.
870. *Linum sulcatum* Ridd. Grooved Flax. Brush Twp., Scioto Co. Clyde H. Jones.
878. Change name to *Ailanthus altissima* (Mill.) Swingle.
883. *Polygala incarnata* L. Pink Milkwort. Jackson Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.
892. *Croton monanthogynus* Mx. Single-fruited Croton. Green Twp., Ross Co. Leslie L. Pontius and Floyd Bartley.
- 950.1. *Triadenum longifolium* Small. Long-leaf Marsh St. John's-wort. Bolster Hollow, near C. C. C. camp, Vinton Co. W. P. Porter and P. S. Wamsley.
985. *Viola pedatifida* Don. Larkspur Violet. Edge of a wood. Liberty Twp., Highland Co. Katie M. Roads.
999. *Holosteum umbellatum* L. Jagged Chickweed. Union Cemetery, Columbus, Franklin Co. H. A. Runnels.
- 1037.1. *Claytonia caroliniana* Mx. Carolina Spring-beauty. Boy Scout Camp, Madison Twp., Lake Co. H. B. and F. J. Tyler. Specimens also, heretofore placed with *C. virginica* L., from Darke, Montgomery, Butler, Clermont, Lawrence, Jackson, and Franklin Cos.
- 1060.1. *Chenopodium incanum* (Wats.) Heller. Mealy Goosefoot. Pickaway Twp., Pickaway Co. Floyd Bartley and Leslie L. Pontius.
1125. *Polygonum tenue* Mx. Slender Knotweed. Plain Twp., Wood Co. R. E. Shanks.
1131. *Geum flavum* (Port.) Bickn. Cream-colored Avens. Tar Hollow, Ross Co. Gordon S. Crowl.
1149. *Rubus phoenicolasius* Max. Wineberry. In a hollow, Tiffin Twp., Adams Co. W. R. Vanlandingham.
1207. *Amelanchier sanguinea* (Pursh) DC. Roundleaf Juneberry. Clifton, Greene Co. E. E. Good.
1233. *Gymnocladus dioica* (L.) Koch. Coffee-bean. Eden Twp., Seneca Co. Burton Fleet. MacDonald Twp., Hardin Co. Nora L. Jordan. New Albany, Franklin Co. Reported by Willis S. Doran. Ohio Twp., Gallia Co. Conrad Roth and Floyd B. Chapman.
1271. *Coronilla varia* L. Coronilla. Franklin Co. Paul Zimpfer. In Herbarium of Capital University.
1275. *Meibomia illinoensis* (Gr.) Ktz. Illinois Tick-trefoil. Deer Creek Twp., Pickaway Co. Leslie L. Pontius and Floyd Bartley.
1283. *Meibomia obtusa* (Muhl.) Vail. Ciliate Tick-trefoil. Kettle Hills, Lancaster, Fairfield Co. C. F. Walker and C. A. Dambach.
1284. *Meibomia sessilifolia* (Torr.) Ktz. Sessile-leaf Tick-trefoil. Deer Creek Twp., Pickaway Co. Leslie L. Pontius and Floyd Bartley.
1313. *Lathyrus tuberosus* L. Tuber-bearing Pea. Defiance Co. C. J. Willard.

1316. *Clitoria mariana* L. Butterfly-pea. Blue Creek, Adams Co. Floyd Bartley and Leslie L. Pontius.
1337. *Heuchera villosa* Mx. Hairy Allum-root. Ohio Twp., Gallia Co. Floyd B. Chapman and Conrad Roth.
1343. *Ammannia coccinea* Rottb. Long-leaf Ammannia. Wood Co. Floyd Bartley and Leslie L. Pontius.
1349. *Rhexia virginica* L. Virginia Meadow-beauty. Jackson Twp., near McDonaldsville, Stark Co. Don M. Brown.
- 1351.1. *Elaeagnus multiflora* Thunb. Slender-stalked Oleaster. From China and Japan. Escaped in Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.
1369. *Enonymus americanus* L. American Strawberry-bush. Vinton Co. C. H. Jones.
1371. *Pachystima canbyi* Gr. Mountain-lover. Scioto Co. Olga Zurcher. In Herbarium of Capital University.
1396. *Liquidamber styraciflua* L. Sweet-gum. Chenowith Creek Road, Pike Co. Gordon S. Crowl.
1418. *Castanea dentata* (Marsh.) Borkh. Chestnut. Apparently native in Montgomery Twp. and apparently escaped in Plain Twp., Wood Co. R. E. Shanks.
- 1439.2. *Betula populifolia* Ait. American White Birch. On low sand ridge. Apparently native. Harrison Twp., Henry Co. R. E. Shanks.
1451. *Hicoria laciniosa* (Mx. f.) Sarg. Shellbark (Hickory). Gnadenhutten, Tuscarawas Co. Chas. E. Miksch.
1458. Change name to *Populus tacamahacca* Mill. Tacamahac Poplar. The scientific name *P. balsamifera* L. has been found to belong to the Cottonwood.
1461. Change name to *Populus balsamifera* L. Cottonwood. The name *P. deltoides* Marsh. cannot be continued because Linnaeus originally applied *P. balsamifera* to the common Cottonwood and the names were later confused. The name Cottonwood has received various names and has been divided up into various varieties and species, but apparently they are for the most part forms which do not deserve specific rank.
- 1483.1. *Tetragonia expansa* Murr. New-Zealand-Spinach. Persistent and volunteer in gardens yearly for the last six years. Ada, Hardin Co. R. A. Dobbins.
1525. *Cucumis melo* L. Muskmelon. Along R. R. track. Near New Vienna, Clinton Co. Katie M. Roads.
1541. *Rhododendron maximum* L. Great Rhododenrdon. Tom's Hollow, Brush Creek Twp., Scioto Co. Conrad Roth and Floyd B. Chapman.
1548. *Gaultheria procumbens* L. Creeping Wintergreen. Washington Twp., Henry Co. R. E. Shanks.
1580. *Phlox stolonifera* Sims. Creeping Phlox. Waterloo State Forest, Athens Co. Walter P. Porter and P. S. Wamsley.
1593. *Convolvulus japonicus* Thumb. Japanese Bindweed. Hamilton, Butler Co. E. E. Good.
1625. *Gentiana procera* Holm. Smaller Fringed Gentian. Pickaway Co. Floyd Bartley and Leslie L. Pontius. In N. Y. Bot. Garden Herb. Reported by W. H. Camp.
1633. *Obolaria virginica* L. Pennywort. Tiverton Twp., Coshocton Co. F. W. Von Ohlen.
1641. *Asclepiodora viridis* (Walt.) Gr. Oblong-leaf Green Milkweed. "In the swamp land in a pasture." Washington Twp., Highland Co. Katie M. Roads. Scioto Co. Clyde H. Jones.
1645. *Asclepias purpurascens* L. Purple Milkweed. Reily Twp., Butler Co. E. E. Good.

1683. *Verbascum phlomoides* L. Clasping-leaf Mullen. In a pasture field on Wintersteen Run, Adams Co. A. R. Harper.
- 1685.1. *Penstemon laevigatus* (L.) Ait. Smooth Beard-tongue. Jackson Co. Leslie L. Pontius and Floyd Bartley. N. Y. Bot. Garden Herb. Reported by W. H. Camp.
- 1687.1. *Penstemon brevisepalus* Penn. Short-sepal Beard-tongue. Jackson Co. Floyd Bartley and Leslie L. Pontius. In N. Y. Bot. Garden Herb. Reported by W. H. Camp.
1700. *Gratiola virginiana* L. Round-fruited Hedge-hyssop. Jackson Co. Floyd Bartley and Leslie L. Pontius. In N. Y. Bot. Garden Herb. Reported by W. H. Camp.
1708. *Aureolaria pedicularia* (L.) Raf. Fernleaf False Foxglove. Plain Twp., Wood Co. R. E. Shanks.
- 1761.1. *Ruellia parviflora* (Nees) Britt. Slender Ruellia. Letart Twp., Meigs Co. Clyde H. Jones. Gallia Co. Floyd Bartley and Leslie L. Pontius.
1789. *Verbena angustifolia* Mx. Narrowleaf Vervain. Highland Co. Floyd Bartley and Leslie L. Pontius. In N. Y. Bot. Garden Herb. Reported by W. H. Camp.
1802. *Scutellaria serrata* Andr. Showy Skullcap. Waterloo State Forest, Athens Co. Also in Bedford Twp., Meigs Co. Walter P. Porter and P. S. Wamsley.
1805. Change name to *Scutellaria ovalifolia* Pers. *S. pilosa* Mx. is invalidated by the older *S. pilosa* Hill.
1825. *Perilla frutescens* (L.) Britt. Perilla. Eastern Adams Co. Arthur R. Harper.
1844. *Meehania cordata* (Nutt.) Britt. Meehania. Carbondale, Athens Co., and Bedford Twp., Meigs Co. W. P. Porter and P. S. Wamsley.
1888. *Aralia hispida* Vent. Bristly Sarsaparilla. Dundee, Tuscarawas Co. Don M. Brown.
1901. *Torilis anthriscus* (L.) Gmel. Erect Hedge-parsley. Hundreds of plants along R. R. near Hillsboro, also in Concord Twp., Highland Co. Katie M. Roads.
1925. *Conium maculatum* L. Poison-hemlock. Miller City, Putnam Co. C. J. Willard.
1985. *Triosteum aurantiacum* Bickn. Scarlet-fruited Horse-gentian. Near Zoar, Tuscarawas Co. Don M. Brown.
1994. *Lonicera sempervirens* L. Trumpet Honeysuckle. Shawnee Forest, Scioto Co. "Fairly common in the locality." Conrad Roth.
- 2076.1a. *Bidens polylepis retrorsa* Sherff. Large-bracted Tickseed. Brush Creek Twp., Scioto Co. Clyde H. Jones.
2099. *Gaillardia pulchella* Fong. Gaillardia. Washington Twp., Henry Co. R. E. Shanks.
2140. *Solidago riddellii* Frank. Riddell's Goldenrod. Joos Swamp, Hocking Twp., Fairfield Co. Chas. R. Goslin. Jackson Twp., Stark Co. Don M. Brown.
2148. *Aster schreberi* Nees. Schreber's Aster. Vinton Co. W. P. Porter and P. S. Wamsley.
- 2149.1. *Aster ianthinus* Burgess. Violet Wood Aster. Jackson Co. Floyd Bartley and Leslie L. Pontius. In N. Y. Bot. Garden Herb. Reported by W. H. Camp.
2170. Change name to *Aster ericoides* L. Dense-flowered Aster.
2176. Change name to *Aster glabellus* Nees. Steel-weed Aster.
- 2176.a. Change name to *Aster pilosus* Willd., Hairy Aster, and renumber as 2176.1.
2183. *Leptilon divaricatum* (Mx.) Raf. Low Horseweed. In an alfalfa field. Urbana, Champaign Co. Claud Neal, sent in by D. D. Dowds.
- 2189.2. *Eupatorium torreyanum* Short. Torrey's Thoroughwort. Liberty Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.

- 2191.1. *Eupatorium pubescens* Muhl. Hairy Thoroughwort. Jackson Co. Leslie L. Pontius and Floyd Bartley. In N. Y. Bot. Garden Herb. Reported by W. H. Camp. This species should probably be united with *E. rotundifolium*.
2209. *Anthemis tinctoria* L. Yellow Dog-fennel. Near Boys' Industrial School, Fairfield Co. L. M. Bloomfield. Marion Co. R. A. Dobbins.
2217. *Matricaria inodora* L. Scentless Chamomile. In a pasture. Marion Co. R. A. Dobbins.
2219. *Matricaria matricarioides* (Less.) Port. Rayless Chamomile. Beside sidewalk, Columbus, Franklin Co.; Clifton Gorge, Green Co., and along interurban R. R. Track, Morefield Twp., Clark Co. John H. Schaffner.
2223. *Artemisia ludoviciana* Nutt. Western Mugwort. Spreading along a road on hilltop, from former planting. Union Twp., Clark Co. John H. Schaffner. Center Twp., along Portage R., Wood Co., apparently escaped; Center Twp., Wood Co. R. E. Shanks.
2240. *Tussilago farfara* (L.) Raf. Coltsfoot. Barnesville, Belmont Co. A large patch along a ditch at the side of the road. Emma E. Laughlin.
2254. *Onopordon acanthium* L. Scotch Thistle. Many plants in waste ground. Rock quarries, Marble Cliff, Franklin Co. John H. Schaffner. Fairfield Twp., Butler Co. E. E. Good.
2283. *Hieracium florentinum* All. King-devil (Hawkweed). In a meadow. Barnesville, Belmont Co. Emma E. Laughlin.
2303. *Lactuca hirsuta* Muhl. Hairy Lettuce. Dry woods. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.
2307. *Lactuca saligna* L. Willow Lettuce. North of Celina, Mercer Co. John H. Schaffner.

Antarctic Biography

It is always refreshing to read of the lives of men who dare to die for an ideal—the goal of accomplishment. Edward Wilson, who accompanied Scott on his fatal expedition to the South Pole, was a man of moral fearlessness, great physical courage and the possessor of a "modesty which comes of a true sense of proportion."

The expedition adventures of Dr. Wilson (M. D.) are of secondary importance in the book, the author's object being to give to the world the thoughts and feelings of a man of character.

Dr. Wilson's interest in birds has been strengthened by his association with fellow members of the British Ornithologists' Union—particularly, Sharpe, Selous, Thorburn and Lodge. His chief talents were sketching ability and devotion to chosen objectives. He completed a series of panoramic sketches of Antarctic mountain ranges which were unique in the annals of polar exploration, and were later reproduced by the Royal Society. His pioneer observations of the Emperor Penguin recall those later made of the same species by members of the Byrd Expedition.

The book is not a great scientific or literary contribution—it is not intended to be. Quotations from diaries and journals of Dr. Wilson make up half the book. These bits of experiences and adventures are used to portray a character of inspiration, and to analyze the psychological and religious influences which shaped a life.

—L. E. Hicks.

Edward Wilson of the Antarctic, Naturalist and Friend, by George Seaver, with an introduction by Apsley Cherry-Garrard. xxxiv+301 pp. New York, E. P. Dutton & Co., 1937. \$3.00.

A NEW GENUS AND FOUR NEW SPECIES OF
CICADELLIDAE (HOMOPTERA) FROM
THE UNITED STATES

DWIGHT M. DE LONG,
Department of Zoology and Entomology,
The Ohio State University

Genus *Orientus* n. gen.

Allied to *Phlepsius*. Elytra marked with ramose pigment lines. Vertex almost parallel margined, broadly rounded with a depressed transverse line back of margin. Vertex margin broadly rounded to front and obtusely angled with it. Male plates deeply notched on outer margins, forming a conspicuous tooth. Pygofer with long processes arising dorsally on inner margins near anal tube and extending apically and ventrally.

Type of Genus *Phlepsius ishidae* Mat.

Although described as a member of this genus, recent study has indicated that it is quite distinct from the other groups previously placed under the name *Phlepsius*.

Laevicephalus flabellum n. sp.

Resembling *flavovirens* in form, color and general appearance, but oedagus of male without recurved lateral processes at apex. Length 4.5-5 mm.

Vertex well produced and bluntly angled, about one-fourth wider between eyes than median length.

Color: Vertex yellow, recurved arcs from front on margin either side of apex brownish, pronotum green, bordered with yellow, scutellum yellow, elytra green. Face brown with pale arcs.

Genitalia: Female last ventral segment sloping to central produced, black tooth, truncate at apex which is produced more than one-half the length of segment. Male plates broad, rounded at apex to inner margins. Oedagus broadened at apex, broadly rounded with a short spine-like projection at either side of broadly rounded margin.

Holotype male, allotype female and male and female paratypes Eureka, California, June 23, 1934 (E. D. Ball), in Ball collection. Male and female paratypes in author's collection.

Phlepsius supinus n. sp.

Resembling *uhleri* in size and form but paler in color with oedagus longer and curved ventrally at apex. Length 4.5 mm.

Vertex parallel margined, broadly roundedly produced. More than three times as broad between eyes as median length. Vertex with thick margin.

Color: Vertex and scutellum tawny, vertex with a white spot at apex. Pronotum and elytra heavily marked with dark brown. Elytra with a brown spot on commissural line at middle and another at apex of clavus.

Genitalia: Male plates rather short and broad, shorter than pygofer. Oedagus bifurcate at apex. In lateral view with a long curved process extending caudally with the apex narrowed and recurved ventrally.

Holotype male collected at Battle Point, Virginia, June 22, 1918, by J. G. Sanders.

***Chlorotettix aurum* n. sp.**

Resembling *suturalis* in general form and appearance but smaller with notched pygofer and four shorter terminal processes on oedagus. Length 7 mm.

Vertex roundedly produced, only slightly longer on middle than next the eye, about twice as broad as median length.

Color: Yellow, unmarked, elytra pale subhyaline, slightly darker along commissural line. Yellow beneath.

Genitalia: Male plates long, gradually tapered to rather acutely pointed apices. A brown mark in center of either plate at base as in *suturalis*. Male styles long and slender, apical half gradually tapered to blunt apices. Oedagus in lateral view curved, basal and apical ends directed dorsally. Apex with four long slender processes, two directed caudally and two slightly anteriorly directed dorsally. Pygofer notched on caudal margin, the portion dorsal to notch strongly pointedly produced. Two pairs of brushes of heavy spines extend from wall of pygofer into genital chamber and almost obscure apex of oedagus. Two of these are attached just below the notch on ventral apical portion and two are attached to dorsal wall above and anterior to notch.

Holotype male and paratype male, Carolina Beach, North Carolina, June 24, 1928, collected by the author.

***Dikraneura lentus* n. sp.**

In general appearance resembling *carneola* but with vertex more bluntly angled and ventral caudal margin of pygofer produced and pointed. Length 3.5-4 mm.

Vertex bluntly angled, two and one-half times as broad as long. Produced two-thirds its length before anterior margins of the eyes.

Color: Dull green tinged with yellow. Vertex dull yellowish, pronotum, scutellum and elytra greenish gray, elytra subhyaline.

Genitalia: Female last ventral segment broadly roundedly produced. Male plates gradually narrowed to rather bluntly rounded apices. Pygofer rounded from dorsal margin to produced, sharply pointed apices of ventral margin. Oedagus with anterior process which is produced dorsally, and apex with four finger-like processes. Two extend dorsally beyond margin of pygofer and two recurve caudally and are directed ventrally.

Holotype male, allotype female and male and female paratypes from White Mt., Arizona, collected July 5, 1935, by F. H. Parker.

BOOK NOTICES

Two New Good Textbooks on Light

There have been for some time a number of textbooks on light which have attained the "standard" classification. Among these, perhaps, the most outstanding is "Physical Optics," by R. W. Wood, which though complete, is so burdened with information minute in character that it is useful mainly as a reference book.

McGraw Hill has undertaken to supply two books which would fill the need for adequate textbooks written with modern problems in mind. The authors and publishers are to be commended on their effort. In considering the problem it must be borne in mind that the subject is extraordinarily rich and minute in its complexity though not essentially difficult to master. The author's problem is therefore not so much one of exposition as it is one of organization and choice of material.

The first of these books is by G. S. Monk (University of Chicago) and entitled simply "Light—Principle and Experiments." It encompasses a larger area than the second book and offers no difficulties great enough to cause trouble to the average college sophomore or junior. Several errors have escaped the author's attention but these are on the whole rather trivial and of a nature to reveal themselves. The optical path through a Gregorian telescope on page 81 is an example of such an error. In the opinion of the reviewer, the book is admirably suited for a course on light given either for a quarter or a semester to students who have had one year of college physics.

The second book is by Jenkins and White (University of California) and entitled "Fundamentals of Physical Optics." It covers a more restricted part of the subject with greater thoroughness, and is on the whole the more difficult and better written of the two books. Its material could not be covered satisfactorily in one quarter or probably not even in one semester. The book presupposes the elementary calculus and is intended for seniors and first year graduate students.

It must be emphasized that both books are thoroughly modern and up-to-date not only in material but in points of view which have suffered some change in character since the great development of interest in atomic problems.

—C. E. Hesthal.

Light—Principles and Experiments, by George S. Monk. xi+477 pp. McGraw-Hill Book Company, Inc., New York, 1937.

Fundamentals of Physical Optics, by Francis A. Jenkins and Harvey E. White. xiv+453 pp. McGraw-Hill Book Company, Inc., New York, 1937.

Quantum Mechanics

Elements of Quantum Mechanics, by Saul Dushman, is an outgrowth of a set of lectures delivered in the summer of 1932 at Ohio State University. The book has been written for the student with little mathematical background and consequently contains in most instances detailed mathematical development.

In the first two chapters are discussed the early experiments which led to the quantum theory and the development of the Schrödinger equation. Subsequent chapters are devoted to potential barrier problems, Wilson-Sommerfeld quantum conditions, the problem of the harmonic oscillator, the rigid rotator and the hydrogen atoms in quantum mechanics and to the theory of perturbations. The final chapters are devoted to the hydrogen molecule, the theory of valence and to the radiation theory. At the end are several appendices which should be most helpful to the reader—in particular the list of collateral reading.

Dr. Dushman's book can be recommended to the beginning student of quantum mechanics, but will probably be of little interest to students well versed in the subject.—H. H. Neilsen.

Elements of Quantum Mechanics, Saul Dushman. xiii+452 pp. New York, John Wiley & Sons, 1938. \$5.00.

More Quantum Mechanics

Professor Kemble has succeeded unusually well in his new book, *Fundamental Principles of Quantum Mechanics*, in formulating many of the mathematical difficulties which confront the advanced student actively engaged in obtaining solutions to physical problems. In his endeavor he has provided a book on the subject far superior to the average and one which should be very useful to the student who has already had an elementary introduction to the subject.

Chapters I and II contain an historical account of the early beginnings of the theory and a discussion of the wave-particle dualism of the atom. In chapter III the Schrödinger equation for one dimensional problems is treated and as well the Kramers-Wentzel-Brillouin approximate solutions. Chapters IV to VIII are devoted to the mathematics of quantum mechanics; the theory of orthogonal functions and their relations to function space; the theory of linear operators and its connection with the general quantum mechanical dynamical variable. The four following chapters concern themselves with the theory of measurement, matrix theory, perturbation theory and the radiation theory. The remaining two chapters are given over to an application of the theory discussed in the earlier chapters to the general problem of complex atomic spectra.

This book fills a very definite need and is enthusiastically to be recommended to students who wish to acquire more than a surface knowledge of the quantum theory.—*H. H. Neilsen.*

The Fundamental Principles of Quantum Mechanics, by Edwin C. Kemble. xviii+611 pp. New York, McGraw-Hill Book Co., 1937. \$6.00.

Thermodynamics

Enrico Fermi's book, *Thermodynamics*, is an elaboration upon a set of lectures delivered at Columbia University in the summer quarter of 1936. The first four chapters of this work are devoted in the conventional way to elementary principles and subsequent chapters treat in much the usual manner such subjects: Thermodynamic Potentials, Gaseous Reactions, Thermodynamics of Dilute Solutions and the Entropy Constant. At the end of each chapter problems will be found, intended to illustrate to the student the principles already set forth.

The book contains only a little more than a hundred fifty pages and in this space a very great deal of material is covered; in fact one is perhaps made to feel a little too acutely that the work is in reality a set of lecture notes rather than a text book on the subject. For this reason one is led to suspect that this book will prove itself most suitable in a course where time is available for considerable classroom discussion and for further amplification on several topics by the instructor in the course.—*H. H. Neilsen.*

Thermodynamics, by Enrico Fermi. x+160 pp. New York, Prentice-Hall, 1937. \$3.00.